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ADVANCED MATERIALS

UK Uses Copper, Ceramics as IC Substrates

3698a138 Paris L'USINE NOUVELLE in French 14 Jan 88 p 62

[Text] The secret of this new IC substrate: It consists of copper on ceramics. It has many applications, especially in aerospace technology, telecommunications, and high-speed data processing. The technology was developed by British Aerospace and its data transfer rates are twice those of traditional printed circuits.

This advantage is the result of the excellent conductivity of the copper tracks, which are deposited using a thick film process. The low expansion coefficient of the ceramic material also allows applications meeting military requirements, such as withstanding temperatures of between -55 and +125 degrees Celsius, and it can also be used for the new, surface-mounted electronics components.

25063

Powder Metallurgy Injection Molding Process at FRG, Swiss Firms

36980144a Paris INDUSTRIES ET TECHNIQUES in French 20 Nov 87 p 110

[Article by Christian Guyard: "Hard Metals: Powder Forming by Injection"]

[Excerpts] This process mass produces complex geometry parts using powder metallurgy.

Powder metallurgy is used in many fields. When it comes to producing highly complex, hard metal (tungsten carbide with cobalt or nickel binder) parts, the choice of fabrication method determines the cost of the part. Since these are very hard alloys, their machining is difficult, and isostatic compression with cladding is equally expensive. Degussa has developed an injection forming process followed by binder elimination and sintering, designed to achieve the desired final properties. Precise dimensioning then requires only finishing. The German firm has reached an agreement with a Swiss company, Vereinigte Drahtwerke Biel AG to use this method for hard metals.

The two companies have built a pilot installation with a capability of one to two million parts per year. The current average size of mass produced parts (10,000 or more) is 10-50 mm with a maximum volume of about 100 cm^3, although single parts as large as 100 mm have been made. The parts are fabricated in two different furnaces. The injection molding takes only 15-30 seconds, but extraction of the binder and sintering of the "green" sintered part require 24-72 hours depending on the thickness of the walls. The available metals are Bidurit FX 15 and FX 30, and Ni 15, which are respectively composed of tungsten carbide and mixed tantalum-niobium carbide with cobalt binder (7.5 and 15 percent) for the first two, and tungsten carbide with 7 percent binder for the third. Given its specificity, this process must be used only when maximum advantage can be taken of powder metallurgy and the properties of the materials being used. The molding comes very close to the part's final dimensions. Moreover, it is possible to build molds, the latter generally does not fulfill the material's homogeneity requirements (segregations, voids) or minimum wall thicknesses when it is not a matter of surface condition [as published].

The two companies continue to work to adapt these process specifications to other alloy compositions such as ferrous materials, nickel superalloys, and so on. The mechanical strength values obtained by this process are equivalent to conventional sintering methods. Complementary processing of HIP densification without cladding can be performed in many cases.

11023

AEROSPACE, CIVIL AVIATION

Airbus Considers Sales to Soviet Union

36988074b Munich SUEDDEUTSCHE ZEITUNG in German 18 Jan 88 p 1

[Article by dpa/vwd: "Renewed Discussion of Airbus Sales to Soviet Union: Apparently Involves 80 Planes/American Embargo Guidelines Cause Problems"]

[Text] Berlin. There is renewed discussion of a purported DM billion deal between the European aircraft consortium Airbus Industrie and the USSR. As reported on the front page of the Berlin MORGENPOST on Sunday, Moscow reportedly wants to facilitate airline flights by German Lufthansa AG of Cologne to and from West Berlin "if an agreement can be reached on the sale of 80 Airbus planes to the Soviet airline Aeroflot."

Bavarian Minister President Franz Josef Strauss is supposed to have received a similar promise from Kremlin chief Michael Gorbachov during his recent visit to Moscow. Actually, the Soviet leader is supposed to have made approval of Lufthansa flights to and from West Berlin dependent on the GDR airline Interflug being granted "landing rights in West Germany and overflight rights over the FRG.

"Concern over such an agreement with Moscow is likely to come from the United States in particular. Reports claim that Federal Chancellor Helmut Kohl would like to negotiate in Washington shortly on the conditions under which the Western Allies would be willing to grant Lufthansa the right to use their air corridors to Berlin.

In this context, airline experts are pointing out that it is not fully clear whether Airbus Industrie could export or lease its planes to the East Bloc at all at this time, given strong U.S. embargo guidelines. Essential components

and equipment in the Airbus—from the American propulsion systems to important electronic areas—are included on the U.S. embargo list. These conditions have already shot down a deal that was virtually closed with Libya.

In the middle of December, the Berlin TAGESSPIEGEL was the first newspaper to report on these sales negotiations. (See SZ of 12/15) At that time the information was not confirmed by Airbus and Lufthansa.

13127

Organizational, Financial Problems Force Changes in Airbus

Airbus-Industrie To Reorganize

36980151 Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 26 Jan 88 p 8

[Article by kj./K.B./gl: "Airbus-Industrie to Be Reorganized: Meeting of an Expert Committee/Bonn Putting on Pressure/No Response From Daimler on Participation in MBB"]

[Text] Toulouse/Bonn/Munich, 25 Jan. The European aircraft manufacturer, Airbus Industrie, is to be reorganized. Reports from Toulouse played down the significance of the story, claiming that the reorganization was not going to change the legal structure of the company, but that it only involved internal reorientation to cope with hectic development. Four representatives from manufacturing countries, France, Great Britain, the FRG and France [sic—should read Spain] met in the French city on Monday to discuss with corporate management questions related to improving corporate structure. Their suggestions for improving cooperation are to be compiled in a report that is to be ready in three months, but is not supposed to be published.

It was stated in Toulouse that the reason for the reorganization lay in the fact that the previous company structure dates from the period 18 years ago when the company was conceived as a study group. At that time, they had a model and no customers. In the meantime, 400 passenger machines have been put in operation, 1,000 orders are on hand from 60 customers, and the program lists a complete family of airplanes.

Official opinion in Bonn and Paris does not appear to favor the British idea of converting the production cooperative into an independent Airbus corporation to counter continuing American criticism of subsidies and below-cost sales. According to reports from the FRG, plans for reorganization would have to evolve out of the enterprise itself. The federal government claims it is not making any plans, but it would pass judgement on them if they were submitted.

Bonn, along with the three other governments involved in the Airbus project, agreed during the previous quarter to assign the question to an expert group in order to improve structures for cooperation in the European civil aircraft industry. Bonn maintains that the need for restructuring is nothing new. The three experts are expected to produce suggestions on how the system can become more efficient. The German expert on the committee is former Director of the Bayerische Vereinsbank, Peter Pfeiffer, who was also formerly a member of the board of directors of Deutsche Airbus GmbH.

The German federal government has pushed repeatedly for a reorganization inside the German airbus industry. Again and again, they have maintained that strong private participation by Messerschmitt Boelkow Blohm (MBB) is essential. The aeronautical and space corporation MBB in Ottobrunn near Munich (37.9%), the French aircraft manufacturer Aerospatiale (37.9%), British Aerospace (20%) and Spain's Casa (4.2) all have shares in the Airbus consortium in its current form. In the yearly report published on Thursday, the federal government underscored the opinion of the expert commission that the aircraft industry must consolidate its corporate structure and above all secure the profitability of the Airbus program. This is the only course of action that will allow the state to withdraw from its extensive financial engagement [in the project] over the long term, particularly with respect to mass production. Furthermore, this action would prevent the airbus from becoming a source of conflict in the area of trade policy. The redirection process has, however, been impeded by the low exchange rate on the dollar. The ability of European aircraft manufacturers to compete in the world market has also been hurt by high indirect support [of the aircraft industry] in America as a result of military aircraft construction.

A spokesman for Deutsche Airbus GmbH in Munich stated that discussions were being conducted "in a regular fashion" as to whether the corporate structure should be altered somewhat. In bad business times, like those caused by the fall of the dollar, considerations aimed at reorganization gain importance. In the past, however, all these considerations have always led to the same conclusion, that they "can live with" the current corporate organization better than with anything else.

Nationalization of German Airbus Considered

36980150b Duesseldorf HANDELSBLATT in German 25 Jan 88 p 1

[Article by hik/gw/gh/ws: "Is Nationalization of Deutsche Airbus the Solution? Messerschmitt-Boelkow-Blohm GmbH/Increasing Rumors of Impending Involvement of Daimler Benz"]

[Text] For some time now the Bonn government has been wanting Daimler Benz AG of Stuttgart to participate in the Messerschmitt Boelkow Blohm GmbH aerospace corporation; now it looks as if there may be a

possibility of this happening. If Deutsche Airbus GmbH of Munich, which has until now been fully owned by MBB, were separated from the MBB corporation and Airbus shares were transferred to the federal government and a few interested federal states, this would eliminate any existing qualms the Daimler Benz board of directors may have against involvement in MBB.

In a discussion ten days ago with the Swiss Handelszeitung, Daimler Benz chief Eduard Reuter named the conditions under which he would be prepared to become involved in MBB. The first, the federal government's decision to cooperate on the Ariane 5, Columbus, and space shuttle Hermes projects, have "essentially been met."

The second prerequisite concerns the Airbus program, which was based on a 2 DM to the dollar exchange rate. "If the exchange rate stays at current levels," according to Reuter, "more billions in subsidies will be required for this reason alone. We are not prepared to use our cash reserves to cover the government's obligations."

Reports on discussions between the state of Lower Saxony and the German Federal Government on participation in Deutsche Airbus GmbH have been neither confirmed or denied. However, this option appears entirely realistic because of the growing impression that the federal states Bavaria, Bremen and Hamburg, which have been involved in MBB in the past, could take over shares of Deutsche Airbus GmbH, together with the federal government, Lower Saxony, and perhaps Baden-Wuerttemberg as well.

MBB would continue to produce parts for the airbus in the same numbers and at "normal prices"—perhaps with participation of Daimler Benz affiliate partner Dornier in order to satisfy employment interests in Baden-Wuerttemberg. Accounting would run through Airbus GmbH, where the losses related to the exchange rate and development costs would "stay put." This would mean that the "Airbus situation" in the FRG would be accommodated for in the same way that the problem is taken care of in France, Great Britain and Spain: France's Aerospatiale, Great Britain's Aerospace and Spain's Casa are all working together on the Airbus project. All three companies are government owned. Airbus planes are assembled in Toulouse.

An alternative to a fully nationalized Deutsche Airbus GmbH would be minority ownership by Daimler Benz AG. This way the management specialists from Unterturkheim could take over "industrial leadership" while still limiting their financial risk.

Airbus Construction in U.S. Debated

36980150c Frankfurt/Main DEUTSCHES ALLGEMEINES SONNTAGSBLATT in German 10 Jan 88 p 9

[Article by Guenther Buschmann: "At the Public Trough Forever? Airbus Production Financial Difficulties Escalating Due to Fall of Dollar; Production in the United States Debated"]

[Text] On the Eastern Airlines flight between New York and Miami, the airline passenger occasionally hears the following announcement: "Ladies and Gentlemen, we welcome you to Eastern Airlines Flight so and so on board Airbus A300. The Airbus is an European aircraft 45 percent of whose parts are produced in the United States.

The nationalistically colored on-board announcement reflects the spirit of the times. America is on the way to a kind of veiled protectionism, piloted over the depths to which the dollar has fallen. Anyone who purchases non-American goods without a compelling reason is suspect in the image-conscious U.S. economy. But if this same customer explains that his foreign product is still essentially American, he can sometimes turn aside such suspicions.

In truth, the are many U.S. manufactured components in the various Airbus-Industrie models, particularly the older planes. For instance, most of the propulsion systems come from the United States, but sometimes the electronics and other equipment as well. In the Airbusses owned by Eastern and some owned by Pan Am, the internal cabin appointments—galleys, seats, upholstery—are also manufactured in the United States.

In the near future, if you believe the rumors in the world aircraft industry, this could go a step further. There are discussions going on between Airbus-Industrie and American aircraft factories on a sort of license arrangement for manufacturing the Airbus in North America. The companies being named as participants in this discussion include the giants such as McDonnel Douglas, Lockheed and General Dynamics.

Future Airbuses From America?

For years a tough battle has been raging between the Airbus-Industrie and the American aircraft manufacturers. Initially the bone of contention was the European aircraft itself, then deliveries to America, but finally, the question of open subsidies, with which primarily the French and West German federal governments have supported the program for years. In fact, the Airbus has not made a profit in any phase of its 15 year history. However, this subsidized operation has made Airbus the number two international aircraft concern, with secure markets.

In the future these markets will become more and more expensive for Airbus-Industrie, which is primarily a German-French enterprise, with participation from the British, Italians, and Spanish. Because aircraft are paid for in dollars, and the dollar has gotten so cheap that DM earnings are no longer substantial. At the same time, a great part of the costs for manufacturing the aircraft must be paid in German marks. Even importing General Electric propulsion systems, which are now considerably cheaper, cannot balance out losses on the other side.

Technical know-how and their own need for aircraft neither here nor there, the Europeans have nearly maneuvered themselves into a no-win financial situation, for even with the most favorable exchange rate, when the dollar was pegged over three marks, Airbus-Industrie was experiencing losses. This would indicate that those losses are structural, which is also understandable. No aircraft factory in the world can start from scratch with a brand new product and be immediately profitable, because start-up costs are enormous. In the U.S. aircraft industry, which lacks the history of having been destroyed and having to start again from the ground up, surpluses from old products have always covered the start-up costs for new ones. In the case of Airbus, there were no old products. Consequently, the national governments have played a role as the financing instrument.

After 15 years this is beginning to get a little questionable. In this amount of time, a product like the Airbus should have reached the profit threshold and begun to turn a profit. But this has not happened for two reasons: First of all, corporate organization is so complicated and costly that profits are almost impossible. Just the logistical problems involved in dividing up final production between Toulouse and Hamburg are absurd. Secondly, the first Airbus model, the A300 B, was joined by a second model, the Type A310, much too rapidly, but the market dictated this move. Its wings alone cost a billion marks in development money. Even for the basic A300 model, the break-even point has been postponed because so many versions have been manufactured.

In the meantime, the Airbus planers have begun preparing a small aircraft model, the A320, which is supposed to compete with the smaller Boeing 757 and 767 aircraft. And finally, they are planning a twin-jet monster version of the A330 model with 400 seats for an 8,000 km range. A four-jet A340 with the same fuselage is supposed to conquer additional markets for Airbus in the long-range market—about 12,000 km.

To be sure, this is absolutely necessary in terms of market perspective, as Lufthansa Engineering Chief Reinhardt Abraham has been emphasizing for years. But this pushes the whole Airbus-family break- even point deep into the next millennium. More public funds will be needed for these programs—from Britain as well as from the French and Germans. Presumably even propulsion system manufacturers like Rolls-Royce and Snecma will pocket additional subsidies.

However, future prospects, as announced by Airbus managers, appear rosy. The entire future market for large commercial planes is supposed to have the potential for around 3,000 units in both the A320 and the A330/340 size classes. At least a third of these, that is 1,000 in each case, will be serviced by Airbus. And of these 1,000, 600 would have to be sold to reach the profit threshold. This statement is just as false as all the others with which the Airbus-Industrie has garnered subsidies in the past: one simply cannot predict what is going to happen over the next two decades, and everybody knows that.

This is a problem for the entire aircraft industry, on both sides of the Atlantic. The difference is only that in the United States the individual companies, Boeing and McDonnel Douglas, pay their expenses internally until the profits start to flow. Subsidies to the U.S. aircraft industry are actually much subtler in nature. They are channeled through the U.S. defense and development budget. Developments remain the property of private companies and can then be used to realize commercial profits. In Europe, public financing is straight-forward direct subsidization. It has to be applied for from the Finance Minister.

Boeing is a good example of how long it can take for a modern commercial plane to reach the profit threshold. The Jumbo Jet, sold initially in 1969, had to sell 500 planes before Boeing reached the break-even point. In spite of a monopoly position for this aircraft, it took 15 years to reach this point. The new 757 and 767 commercial airliners, which were built without really addressing the needs of the market, are still flying deep in the red ink, while Boeing uses surpluses from the Jumbo and their twin-jet hit, the 737, to make up for their losses.

Given this background, plus the abstruse organization of Airbus production and the skewed dollar rate, public coffers will have to cough up subsidies for the Airbus program on through the year 2010. Only then will it be possible to cover production costs for the final aircraft in the program.

If ever. That is the next question: after one and a half decades, the original A300 is still not profitable, and it won't be even twenty years after start-up. In spite of brilliant market prospects, these conditions that make it difficult for the government to service the debt for a private industry project. What is the automotive corporation Daimler Benz supposed to do with its controlling share in Airbus partner MBB if it has to count on another 29 years of nothing but losses?

So the government will have to keep paying. This could result in a protectionist division of the markets. The Europeans—under the leadership of Lufthansa, which manager Heinz Ruhnau and Airbus salesman Franz Josef Strauss have made dependent on the state, and Air France, which is a nationalized industry—will avoid buying Boeings if there is a comparable Airbus. Although Boeings are cheaper with the low dollar rate. Airbus will also try to establish itself in the East Block countries, such as the DDR, Poland, and the Soviet Union. And this too is only possible with governmental influence. The U.S. embargo conditions against shipping high-tech General Electric propulsion systems will probably be ignored.

On the other side of the coin, the Americans will force their airlines to "buy American." This can even be undergirded on the accounting side, given the current dollar rate. If Airbus wants to expand its market in the United States anyway, it would come at an extremely high price: through production under a quasi-licensing agreement. McDonnel Douglas, Lockheed, General Dynamics, Rockwell and Northrop are all companies that could manufacture aircraft cells for Airbus. Even assembling the Airbus wings would cause them no difficulties. The propulsion systems come from the United States anyway. Almost a senseless undertaking for Airbus, because they hardly make any profit on the deal themselves.

Polarization of world aircraft production in the hands of two giants would shrink the free markets. At the same time, would shrink the options the airlines have in choosing between different manufacturers, which Lufthansa has exploited brilliantly in the past. Asia and Australia would remain as free market regions, and small commercial planes and business craft would be freely tradable commodities. In their bitter struggle for the really big hunks of the market, Europe's Airbus managers have forgotten that in the meantime, these markets are served not just by the Americans, but by the Brazilians, Canadians, Indonesians, and Dutch as well.

Earnings, Orders for 1987 Reviewed

36980150d Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 20 Jan 88 p 1

[Article by K.B.: "There Should Be No Trade War over the Airbus: Best Sales Record/But Calculations Weak/ Only Limited Possibilities for Cooperation"]

[Text] The European Airbus-Industrie has turned in its best sales record to date. However, since the exchange rate on the dollar has fallen so drastically, the calculations don't add up as well as they used to. Parliamentary Secretary of State in the Federal Ministry of Commerce, Erich Riedl, federal government coordinator for the aeronautics and space industry, is talking about an almost tragic contradiction. In an interview with this newspaper, Riedl made reference to the fact that last year there were 224 firm aircraft sales, and 107 additional options. Until this year, the best sales record had been in 1979, with 112 planes. Order inventory includes 771 firm orders and 349 options. With its sales results, Airbus is on the upswing in the international aircraft business. This is clearly a growth market. Bonn is pleased to observe that the Airbus consortium is also currently in negotiations with Aeroflot (F.A.Z. of 19 January).

Government aid for the current program is based on projections that set pegged dollar exchange rate at DM1.80. The production component of Deutsche Airbus GmbH is financed with federal government guaranteed bank credits. This also covers exchange rate risks, but not to their full extent. A cabinet decision of July 1987 limited—i.e., put a ceiling on—the federal guarantee to DM3.1 billion.

Riedl says that it won't be absolutely clear how much Deutsche Airbus has lost because of the fall of the dollar until the yearly report comes out. What this will mean in terms of additional debt burden on the federal government will have to be cleared up during 1989 budget hearings. Financing for the current year is supposed to be secure. For the moment the fall of the dollar is having the effect that the order inventory is falling in value. It won't be clear what the exact losses are for Airbus-Industrie until each individual airplane is delivered, for two thirds of the order value is due on delivery. But, according to Jean Pieson, consortium president of Airbus-Industrie, nobody knows at this point how the dollar will be pegged at that time. Until then, the dollar may make up for the mark down.

Riedl justified high subsidies for the Airbus by the fact that we are dealing with a highly technical industrial product dictated by public policy. When asked last week whether the federal government must not be more critical in evaluating dollar-dependent subsidies, Federal Chancellor Kohl responded that the Airbus subject is not necessarily a subject of subsidies that deserve any kind of perpetuation. He noted that he was not the inventor of the airplane, but he did consider it part of his program. The Airbus has to be viewed as a modern technical development, and money has to be available for such future-oriented investments.

The American government views subsidies for the Airbus as a source of conflict. From 27 to 29 January there will be new negotiations in Geneva between the United States and a delegation from the Brussels Commission and the four countries who are building the Airbus. The Trade Ministers intend to deal with the situation a few weeks later. Washington is demanding that the Europeans exercise discipline in the matter of subsidies. In the event that no mutually acceptable regulation can be reached, Washington is threatening counter measures, primarily import tariffs on the Airbus. The federal government and the governments in Paris, London, and Madrid do not want to let this turn into a trade war. Nor does the American government want to go this far.

In their defense, Airbus countries have pointed out repeatedly that the American aircraft industry itself is subsidized on a massive scale and that the United States is supplying a great deal of equipment for the Airbus, primarily propulsion systems and cockpit equipment. As Riedl sees it, one option for easing the conflict would be to increase cooperation between Airbus-Industrie and the second largest American manufacturer, McDonnel-Douglas. The federal government has put out initial feelers in this direction. In the meantime, there have also been discussions of a joint venture agreement, although Riedl admits that the scope within which this might take place is limited.

13127

Italy, Argentina: New Aviation Firm

36980192b Rome FINMECCANICA NOTIZIE in Italian 31 Aug 87 p 4

[Text] In the framework of the program for aviation industry cooperation between Italy and Argentina, the corporate charter of the company FAMA S.A. Fabrica Argentina de Materiales Aerospaciales has been signed in Buenos Aires. Forty-six percent of the shares will be held by the Argentine state, 44 percent by Aeritalia, and 10 percent by the Argentinian company Techint.

Among the main objectives of the Italian-Argentinian cooperation program is conversion of Fabrica De Aviones of Cordoba into a corporation with participation of private capital, with the purpose of increasing and optimizing production and services, improving the penetration capability into international markets, and insuring the possibility of access to the most modern and advanced aerospace technologies.

The formation of FAMA is an important step in the industry privatization program of the Argentine state.

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Aeritalia, Gavazzi Join To Develop Space Electronics

36980192c Milan TECNOLOGIE MECCANICHE in Italian Oct 87 p 207

[Text] Aeritalia, Societa Aerospaziale Italiana (IRI-Finmeccanica Group), and Carlo Gavazzi, an instrumentation and automation company, have formed the Carlo Gavazzi Space company, with headquarters in Milan, for development of space-application electronics.

The new company, with initial capital of 1.5 billion, will conduct design and production activities for electronic equipment and systems for space vehicles and for ground control and support stations. The Gavazzi group will be primary with 70 percent of the capital, while Aeritalia will hold 30 percent, though the latter will assume strategic management of the new company.

Carlo Gavazzi Space will concentrate on scientific and applied research, particularly land observation and technological exploitation of space along the line of the activities by Carlo Gavazzi Controls for the European Space Agency (ESA) and for the National Space Plan (PSN). Production will be concentrated in the Turin plants of Aeritalia and in the Milan plants of Carlo Gavazzi.

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Aeritalia Increases Its Capital

36980192a Milan TELEMATICA 2000 in Italian 14 Oct 87 p 2

[Text] Aeritalia's capital increase has been implemented. The decision was taken at the end of September by the board of directors of the company, which the IRI group controls through Finmeccanica. The company's stock increases from 300 to 337.5 billion through the issuing of 37.5 million new shares with nominal value of 1,000 lira. The surcharge decided on by the directors of the company is 1,700 lira. Thus, the new shares will be put on the market at 2,700 lira. A figure exceeding 100 billion lira will thus flow into Aeritalia's coffers. It should be noted that the company's net profit forecast for the end of the year is 47 billion, a 30-percent increase.

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Special Computer System Used for Hermes Wind Tunnel Tests

369890174c Duesseldorf VDI NACHRICHTEN in German 15 Jan 88 p 15

[Article by Wop: "Hermes Flies in the Wind Tunnel: European Space Shuttle in the Predevelopment Phase; Aerodynamics Experts Determine Optimum Form for Reliable Shuttle Flight"]

[Text] Bremen. Since 1 Jan, Phase 1 of the Hermes Development Program has been running within the framework of Esa. The participating countries in the European Space Organization made the decision in November 1987 to have initial development work conducted within a period of three years. The decision to implement the Hermes space shuttle should take place after the results of Phase 1 have been reviewed. Wind tunnel work is in full swing at MBB with measurements to determine the optimum configuration of the space shuttle for flight in the atmosphere.

Initial wind resistance measurements have begun on a model of the European Hermes in the wind tunnel at MBB's Division for Transport and Passenger Aircraft. Within the framework of predevelopment for the Hermes Project, Messerschmitt-Boelkow-Blohm has the job of conducting numerous measurements on various sizes of models. These measurements will help determine the optimum configuration of the shuttle for flight in the atmosphere. They are taking place in several wind tunnels operated by the European Aerospace industry, as well as in research institutes.

The model being tested in the MBB wind tunnel in Bremen represents an engineering innovation. For the first time in company history, the design was processed on a computer system that converted the three dimensional form of the shuttle from the video screen directly into commands to control a milling machine in the MBB milling center in Varel near Wilhelmshaven. This system, which is called CATIA (Computer Graphics Aided

Three Dimensional Interactive Application), accelerates the entire work procedure, increases manufacturing accuracy, and considerably decreases possible causes for error.

This first Hermes model being tested by MBB is on a scale of 1:15. It is made of aluminum. The hollow fuselage of the model was cast and then milled to form, while the wings, flaps, and tail assembly were created from solid aluminum plate. The tolerances amount to 1 mm over the 1-m length of the model and 0.1 mm for the thickness. The Varel machining center stayed well below these values, which speaks well for the CATIA manufacturing system. It forms the basis for obtaining reliable predictions from the wind tunnel measurements for the flight characteristics of the space shuttle in a large model version.

The model space shuttle weighs approximately 80 kg and is suspended in the wind tunnel on six thin steel wires. Consequently it virtually "floats" free in space. That is, air can flow freely around the model. The wires have very minimal effect on the flow field within the measured distance. Furthermore, any such influence on the flow field can be determined with very great accuracy. The forces exerted on such a model by the air flow in the wind tunnel are measured and contribute to determining optimum form.

The configuration of the Hermes model from the FRG aerospace firm is a pure research project. Its geometry has been changed somewhat in comparison to the original Hermes geometry. This was necessary in order to study the effect that form changes would have on the space shuttle. Finally, this aerodynamic research has been assigned the task of arriving at an optimum form for the space vehicle via a chain of geometric changes. For this reason, the first measurement which has been completed in Bremen will not be the only one. There are plans for the Transport and Passenger Aircraft Division to conduct measurements on approximately ten different models.

Hermes, which, to be sure, must land at an airport after finishing its tasks in orbit, will lift off from Kourou in French Guyana, South America, powered by an "Ariane 5" rocket. The landing after a mission in orbit will not take place in French Guyana.

In contrast to the American shuttle, the European Hermes does not have its own propulsion system. This means that the space vehicle must reach the earth like a glider. After it reenters the atmosphere at about 25 times the speed of sound or at a velocity of 7.8 km/s, the Hermes must possess the capabilities of an airplane in the entire velocity range up to the point when it lands.

Requirements and stresses vary considerably throughout the velocity ranges. At high speeds, grave temperature stresses occur. This explains the bulky design and stubby nose of the space vehicle. In the subsonic range it is important for the craft to possess good gliding and effective steering capabilities because the Hermes must land like a glider, without any engine support, but at a speed considerably higher than 300 km/h.

Basically, different forms are required for optimum flight in the different hyper-, super-, and sub-sonic speed ranges. For instance, the front part of the fuselage is designed to conform to hypersonic requirements, while the size of the wings and the size of the horizontal and vertical rudders is determined by the landing approach speed. This requires a great deal of research and development work for landing, in which the German firm has a critical involvement.

The research is necessary primarily for structuring a safe final approach phase, even under adverse weather conditions (for instance side wind). In order to optimize the final form of the shuttle, its control surface and landing support are used for measurements. 13127

More Problems With Netherlands' Fokker 100 Program

Delivery Delayed

36980155 Rotterdam NRC HANDELSBLAD in Dutch 20 Jan 88 pp 1, 11

[Report by editors Pieter Graf and Dick Wittenberg: "Delivery of Fokker 100 Delayed Again"]

[Text] Amsterdam, 20 Jan—The delivery of the first Fokker 100 to the Swiss airline company Swissair has once again been delayed. Production of the Fokker 100 will be straightened out at the earliest during the second half of this year.

According to the expectation of insiders, the airplane factory won't have completely mastered the production process of the Fokker 100 until the end of this year. A short while ago it was reported that the first Fokker 100 would be delivered on 29 January 1988, with a delay of 9 months. That date has now moved to 25 February.

According to Fokker, the new delay is to be blamed on problems with the tires of the nosewheel. During the first flight tests on wet runways it turned out that too much of the water splashing up from the nosewheel could get into the jet engines. The manufacturer, Dunlap, was subsequently asked to design a new wheel, which meanwhile has been done.

Tests with the prototype of it appeared to suffice. Swissair, however, demands that the tests be done once again with tires from the normal production series. They won't become available until the middle of February. As to questions on further problems with Swissair, Fokker's spokesman, G. Knook, refuses to comment.

According to spokesman H. Schmell of Swissair, currently there is a difference of opinion with Fokker on "a total of 22 points." "They are largely minor points. The most important are: the tires and the temperature in the area where the flight computers are located.

The latter problem is technically too complicated to explain in just a few words, but it most be solved in order to obtain certification," said Schmell.

The support arrangement which Fokker agreed upon with the government last October—in which the state strengthened Fokker's capital by 212 million guilders—purposely creates room for further delays in production. That those would occur was already expected in a prognosis from the National Investment Bank.

The latest problems of the Fokker 100 were discussed in Zurich last week by Fokker's board member dr R. J. van Duinen with the board of directors of Swissair. The discussion included the matter of additional compensation. Neither party wished to go into the extent of that.

As a result of the delays with the Fokker 100, Swissair was forced to lease back airplanes of the DC-9 type which it had sold earlier. Last year already that led to a claim for compensation of about 5 million Swiss francs.

Schmell points out, however, that the delays in the deliveries of the Fokker 100 are not unique in themselves. "We are often among the first who order a new machine, and that entails risks. We had the same experience with the DC-9-81 of McDonnell Douglas and with the A 310 of Airbus. In those two cases, too, the agreed upon delivery time was exceeded.

For the time being, KLM is not expecting difficulties with the Fokker 100's it ordered, the first of which is supposed to be delivered in September. Spokesman P. Offerman of the KLM: "We don't expect the problems with the first machine to influence the delivery dates for our airplanes."

Insiders question that. According to them, the first three Fokker 100's will certainly come from the factory within a reasonable period of time now, but afterward production will stagnate again with the fourth machine. The reason is that, for the construction of those first three airplanes, certain parts which did not arrive in time are being taken from machines which are in an earlier stage of production.

Initially the intention was that Fokker would accelerate more the production this year in order to catch up with the backlog incurred last year. It looks as if Fokker will still need a considerable part of the current year in order to have the production of the Fokker 100 proceed smoothly, as meanwhile appears to have been managed with the Fokker 50.

That could have some influence on an additional order by USAir. That American company has ordered 20 Fokker 100's and has taken an option on another 20. USAir has asked Fokker to move up the delivery dates, and if that succeeds, expressed its willingness to change its option to a definite order. Fokker's spokesman refuses to comment on this also.

Executive members of the FNV [Netherlands Trade Union Federation] reacted with surprise to the new delay of one month with the Fokker 100. "As management, you're absolutely made a fool of," says one of them, "if first you hang posters everywhere in the company with the announcement that the transfer will take place on 29 January, and then that date is moved again by a month."

They also wonder how things will go now with the production of the Fokker 100. The planning was based on a production of 23 machines this year as a step toward a tempo of 33 in 1990 and afterward. They doubt that that number of 23 can still be attained.

Cooperation or Merger Required

Rotterdam NRC HANDELSBLAD (supplement) in Dutch 20 Jan 88 p 1

[Excerpt] Fokker's future depends primarily on the dollar. If that dollar continues to stay at around two guilders for many years, then Fokker is doomed. In that case all the government money that was put into Fokker will have been in vain. But if the dollar increases and the market seems firm, perhaps a bright future is in store for Fokker. Then the possibility exists that the government will get back all its credits with interest.

There does not appear to be much chance that Fokker will experience this resurrection as a "self-creating" airplane builder. The government did not without reason stipulate the condition with its last support operation that Fokker must initiate cooperation or a merger before the end of 1990. In an explanation, Minister De Korte said that the Fokker 50 and the Fokker 100 are the last airplanes which the company will build under its own management. With that, an end has come to 40 years of industrial policy in which a "self-creating airplane industry" was considered "essential to the Dutch economy."

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BIOTECHNOLOGY

European Researchers View Biotechnology Applications of Microgravity Tests

3698m177 Milan CHIMICA OGGI in English Sep 87 pp 33-35

[Article by P. Couasnon and A. Ducruix, Institute of the Chemistry of Natural Substances, Gif sur Yvette, France; J. Cornier, Intospace GmbH, Hannover, FRG; and J. P. Raynaud, Roussel Uclaf, Paris; "Biotechnology in Space: Help From the Sky"]

[Excerpt] Does it make sense to talk about biotechnology in space at a time when flight opportunities are still very scarce and when the investments required for experiments in a largely unexplored field are huge?

This is the kind of challenge that biotechnology is facing today, but it is exciting to note that more and more pharmaceutical companies have decided to take the risk, lured by the possibility of designing more specific and efficient new drugs. The race for the development of such compounds is now based on an increasing understanding of the three dimensional structure, at the angstrom level of resolution, of the active sites of the receptor proteins that bind these compounds and this information can best be obtained from protein crystals. However, receptor proteins are often highly labile and their crystallization is beset with many difficulties some of which might be solved by experimentation in microgravity.

The timescale for the development of a new drug or the implementation of a space program is basically the same, i.e. 10 years. It is thus clear that to be ready for the first space flights in the 90's, now is the time to study the fundamental aspects of microgravity biotechnology. Otherwise it will soon be too late to enter a race in which the well-prepared will have a definite edge on latecomers. (Footnote 1) (M. DeJackmo; "Pharmaceutical Companies Nervous about Space Processing Implication?" in News from International Resource Development Inc,: Market-Product Planning (6 April 1982))

Purification: Free Solution Electrophoresis

It is generally agreed that electrophoresis can be divided into four modes: moving boundary electrophoresis (MBE), zone electrophoresis (ZE), isotachophoresis (ITP) and isoelectric focusing (IEF). The first three modes give a separation based upon the difference in the electrophoretic mobilities of the components. The last mode gives a separation based upon the difference in the isoelectric point (pI) which is defined as the pH value at which an amphoteric modecule has a global neutral charge and does not move when subjected to an electric field.

The emergence of the new biotechnology industry is based on genetic engineering and production of biologicals characterized by high activities but also high complexity and lability. Since extreme pH and salt concentration tend to precipitate proteins while excessive shear and temperature will denature them, the drastic conditions of the techniques routinely used for preparative scale purification make them unsuitable for many biologicals. Because of its different characteristics and especially its vastly superior resolving power, electrophoresis has attracted much interest in its preparative version (Footnote 6) (R.A. Mosher, W.Thormann, N.B. Egen, P. Couasnon, D.W. Sammons; "Recent Advances in Preparative Electrophoresis" in New Directions in Electrophoretic Methods (J. Jorgenson and M. Phillips Eds); ACS Symposium Series 335, Washington, 247 (1987)) and a great deal of work has been done in view of its application both on earth and in a microgravity environment.

The scale-up of analytical methods that are run in gels, such as polyacrylamide gel electrophoresis (PAGE) and polyacrylamide gel isoelectric focusing (PAGIF), is possible but the amounts of products obtainable are insufficient for industrial applications. Currently, the most promising approach is electrophoresis in free solution. The technique, pioneered by Hannig (Footnote 7) (K. Hannig; Electrophoresis 3 235 (1982)) and called free flow electrophoresis, consists in flowing a thin film of liquid between two parallel plates. Carrier and buffer solutions are continuously injected into one end of the cell. An electric field is applied perpendicular to the main flow, resulting in differential deflection of the charged constituents. Protein samples are collected at the other end of the cell through an array of outlet ports.

The principal phenomena which limit resolution and throughput are sedimentation and convection induced by gravity. In order to achieve an efficient separation, high current density or long residence times are used, which cause joule heating of the liquid medium. This changes the density and thermal conductivity of the solution and alters the electrophoretic mobility of the processed materials. It also leads to a remixing of the different species by thermal convection.

Moreover, the sample solution to be processed generally has a density greater than the buffer medium, especially in the case of concentrated samples, and this difference is sufficient to cause convective mixing and to influence separation. Lastly, in the case of larger particles, rapid sedimentation can cause disturbance during the purification.

An ideal way of overcoming these gravity-dependent phenomena is to conduct the same separation in a microgravity environment. In space, gravity can easily be reduced by at least three orders of magnitude. Natural convection due to the thermal gradient, sedimentation or density differences are less important and a resolution similar to that obtained in anticonvective media such as gels can be expected. On-line collection is then possible enabling large-scale purification. Extensive effort has already been put into this line of work both on earth and under microgravity. One need only mention the ambitious EOS program (Electrophoresis Operation in Space) launched by McDonnell Douglas, the research activities sponsored by the National Aeronautics and Space Administration (NASA) through its centers for excellence (for example, experiments by M. Bier from the Center for Separation Science in Tucson, AZ on IEF under microgravity), the Japanese program coordinated by the MITI and a few European projects such as the cell separation experiments of K. Hannig and H. Wagner (FRG) and the development of a prototype for protein purification by V. Sanchez (CNRS, Toulouse) sponsored by Matra Espace, Roussel Uclaf, the National Center for Space Studies (CNES) and the CNRS (France).

Crystallography

At the present time, X-ray crystallography is the only available technique for establishing the three dimensional structure of complicated biological macromolecules (proteins or nucleic acids). Since large high-quality single crystals are necessary to obtain diffraction data, crystal growth of biological macromolecules has become a topic of some importance and a limiting step in the development of molecular biology. (Footnote 8) (C. Bugg; J. Cryst. Growth 535 (1986)) This is why several major pharmaceutical companies have integrated protein crystallographers into their drug design teams.

It is clear that purification and crystallization of biological macromolecules are linked. (Footnote 9) (R. Giege, A. Dock, D. Kern, B. Lorber, J.C. Thierry, D. Moras; J. Cryst. Growth 554 (1986)) Although more than 600 biological macromolecules have already been crystallized by trial and error, no general rationale has emerged (Footnote 10) (A. McPherson; "Preparation and Analysis of Protein Crystals;" J. Wiley and Sons, N.Y. (1982)) and, despite improvements in methodology over the last 15 years, there is still a need to bring protein crystal growth from the realm of an "art" into the accepted field of physical chemistry. (Footnote 11) (F. Rosenberger; J. Cryst. Growth 618 (1986))

The strategy for crystallizing biological macromolecules is to bring the system very slowly towards the state of minimum solubility and thus achieve a limited degree of supersaturation. Many parameters influence crystallization among which are temperature, pH, the nature and concentration of the precipitating agent (salt, polymer or organic solvent), but it is not known to what extent gravity plays a role. Better crystals could be expected in space because convections are minimized, nucleation is limited, there is less or no twinning and because crystals grow slowly in isotropic conditions. Attempts have already been made to adapt the three main techniques used to grow crystals on earth (liquid-liquid interface, vapor phase diffusion, and dialysis) to conditions in space.

—Liquid-liquid interface:

Two solutions of different density (biological macromolecule and precipitating agent) are carefully layered on top of each other until crystals appear at the interface. (Footnote 12) (R. Salemme; Arch. Biochem. Biophys. 151 533 (1972))

This technique is simple to use but the system is extremely unstable. A prototype has been developed by W. Littke and the European Space Agency (ESA) (Footnote 13) (W. Littke, C. John; J. Cryst. Growth 663 (1986)) for use in space and was operated in Spacelab. In order to reduce crew time, the experiment was run automatically. Crystal growth was performed either at constant temperature (20 degrees C) or by increasing the temperature to lower the solubility of the protein. Two proteins were studied: lysosyme as a standard and beta-galactosidase, the structure of which is still unknown. Protein crystallization takes place within the protein chamber because of the low velocity of diffusion of protein molecules. The crystals made in space were larger than those grown on earth but problems arose because the experiment could not be stopped before re-entry into the atmosphere.

—Vapor phase diffusion:

This is the principal technique used on earth. Hanging drops or sitting drops of a few microliters of biological macromolecules are kept in equilibrium in a closed container against a reservoir of precipitating agent which is used to lower the solubility of the protein. A prototype built by C. Bugg and the NASA (Footnote 14) (L. DeLucas et al.; J. Cryst. Growth 681 (1986)) was tested on several occasions in the middeck area of the shuttle before the disaster of January 1986, but problems arose because the experiments were not at constant temperature and because handing drops were unstable.

—Dialysis:

A dialysis membrane separates protein from the precipitating agent which can cross the membrane. (Footnote 15) (M. Zeppezauer, H. Eklund, E.S. Zeppenzauer; Arch. Biochem. Biophys. 126 564 (1986)) In contrast to the preceding techniques, the conditions of crystallization can be indefinitely modified, the set-up is very stable and the experiment could be stopped before landing thus enabling the recovery of the crystals in order to collect diffraction data etc... A prototype based on this technique and consisting of two seringes that control the concentration of precipitating agent in a thermoregulated chamber is under development by Aerospatiale, CNES, CNRS and three French pharmaceutical companies (Roussel-Uclaf, Rhone-Poulenc, Sanofi). (Footnote 16) (C. Claramonte, J.P. Mornon, M. Riess, A. Ducruix, V. Mikol, R. Giege; FEBS Advanced Lecture Course Abstract, Bischenberg, France (1987))

For all these developments the emphasis is still on long-term basic research. In the case of protein purification and condensed matter physics, the feed-back from space research had a significant impact on earth based technology. Moreover, in the U.S., financial support from the NASA made possible collaboration between physicists, crystallographers, and molecular biologists; it is to be hoped that Europe will follow this trend.

Industrialization in Space

Interest in the utilization of space facilities for scientific and technological experiments under conditions of weightlessness is increasing. More and more companies and institutes outside the aerospace industry are joining the "space user community" and a few specialized companies have been recently created in several European countries with the aim of helping these industries to

enter the field of microgravity experimentation. For instance, Novespace (France) keeps small and medium-sized companies informed of potentially transferable space innovations; Biospace's (Belgium) activities are focussed on chemistry, biology and biotechnology; their cell fusion and fluid physics experiments have already been flown on board air fighters. In Germany, four centers of excellence have been established by different institutions with the status of private companies whose financing depends upon contracts with industry. These centers are ACCESS in Aachen, WIB in Berlin, ZARM in Bremen, and MUSC in Koeln.

An example of such organizations for space commercialization is Intospace GmbH which was established in October 1985 in Hannover (FRG) as an international company for the commercial utilization of microgravity. (Footnote 17) (Aviation Week and Space Technology, June 16, 28 (1986)) (Footnote 18) (P. Pletschacher; Space Markets, Spring, 44 (1987)) The shareholders come from 94 companies in 9 European countries. Two thirds of the shareholders are from the user industry and represent chemical and pharmaceutical companies but also the automobile and steel industry, machine and equipment manufacturers as well as service companies. Its purpose is to spread among potential users a better knowledge of the microgravity environment and to help them perform experiments in space while maintaining confidentiality. The company is in contact with partners offering launch services in Europe, the U.S., Russia, and China. Flight opportunities extend from short-term missions performed by sounding rockets (Texus program) to long-term missions within the framework of manned (Spacelab) or unmanned (automated platforms like Eureca) flights.

The involvement of industrial users fulfils the political will of European governments at a time when decisions on new space programs have to be taken. The space station will permit more and more industrial and research scientists to investigate processes to improve or develop new products with the help of microgravity. A space infrastructure of more than 15 billion dollars will be built by Europe and "users" are stringently needed. This progressive involvement will be the "Space Revolution" of the next 15 years...

Conclusion

Biotechnology in space represents a unique opportunity for a multidisciplinary, multisectorial and multinational approach to the development of life sciences. From past experience and success in microelectronics and condensed matter physics, we can be confident, that in a near future, similar improvements in the purification and crystallization of proteins, nucleic acids and macromolecular complexes will occur leading to the design and production of reactants and biologicals that will be the sources of the new drugs of the 21st century.

08800

Dutch Firm Moves Toward Field Test of Genetically Altered Potatoes

36980156 Amsterdam DE TIJD in Dutch 8 Jan 88 pp 36-38

[Report by Piet Hagen: "The Stunt with the Spud; How Biotechnology Lends the Potato a Helping Hand"]

[Excerpts] The optimism of many biotechnologists is countered by the concern of many environmental experts. Altering a potato genetically will soon be a simple matter, but do we know what we are doing when we unleash such a novelty in the open air?

Dr Peter van den Elzen, research head of the firm Mogen International NV in Leiden takes questions of concern very seriously. At the same time, he has great confidence in his undertaking. He is convinced that it is completely justified to plant the first 'altered' potato tubers in Dutch soil this coming spring.

"It is a test surrounded by precautions," he says. "We have gained experience in the lab. Now we want to test the transformed plants outside on two plots of 60 square meters. We are going to fence off the areas, spread them with insect netting and, moreover, we will remove all flower buds, so that the spreading of pollen is impossible. Even under normal conditions, cross pollination with related weeds such as black nightshade is extremely unlikely. But even if the genetic characteristic added by us should be adopted elsewhere in nature, it is still difficult to see why that would be risky. In nature, there are already some potato strains which of themselves are resistant to the virus we want to fight. Then would it be so bad to add that characteristic? Moreover, we need not fear an unchecked propagation of the manipulated potato, for the potato, as a cultivated crop, does not grow wild.

Mogen International NV was established in 1985 with capital from the American biotechnological firm Molecular Genetics Inc. and the Dutch Association for Industrial Products. Subsequent participation of the Amro Bank turned the company into an independent Dutch nv [limited liability company]. Since January 1987, Mogen has been situated in a brand new building in the Bio-Science Park adjoining Leiden University. One only needs to cross Einstein Road in order to translate academic theory into commercial practice.

The transfer from pure science to lucrative industry attracts more and more biotechnologists. Van den Elzen shuttled from the Free University to the American company Advanced Genetic Sciences Inc., from there back to the Free University, and then to Mogen. Another shuttler is the well-known Leiden professor R.A. Schilperoort, who first was involved in the founding of the Bio-Science Park in Leiden and now is transferring part-time to the firm Greengene NV in Wageningen.

In Mogen's laboratory, the potato has been tinkered with for one year. In sterile cabinets, small slices of the core of the potato tuber are being injected, as it were, with new pieces of hereditary material. The latter is introduced into pieces of DNA of the Agrobacterium tumefaciens, an intruder which, like an injection needle, smuggles the desired characteristics inside. Subsequently the tiny slices of potato are bred in glass tubes at an agreeable temperature and under strong light. Once they have outgrown the incubator, they are allowed to develop further in real potting soil in ordinary brown flower pots.

Whoever enters the laboratory must put on a white coat. In the lab there is a permanent negative pressure so that "weird creatures" cannot escape to the outside. Water and waste are collected in containers and sterilized. In the cultivation chambers, blooming plants are shrouded in plastic in order to prevent pollen from moving about freely. Exaggerated?

"No," says Van den Elzen, "as long as the tests are in an experimental stage one should strictly comply with all safety regulations. Perhaps later on it will turn out that it was not necessary. But one must not take risks."

Harmful

Then why do tests in the open air? Isn't that much too risky? In the United States experiments are permitted on a very selective basis. Also the FRG is very cautious. Denmark prohibits practically all tests in the open air. Is it justified, then, to plant Mogen's transformed potatoes in Dutch soil?

Van den Elzen: "In August we submitted an application to the recombinant-DNA commission which judges these types of tests. At the end of December the commission made a positive decision. Now we are able to apply for a nuisance act permit at the municipality of Dronten. It is hoped that the first potatoes will be planted in May or June."

Still, the field test proposed by Mogen is a daring step for the Netherlands. Earlier tests with altered organisms in the environment (in Wageningen and Dronten) were much more limited in scope. Some experience has indeed been gained abroad, but data on long-term effects do not exist. Out of fear for harmful effects to the environment, a group of people living in California has halted a field test on strawberry plants with the bacterium Pseudomonas syringae for a long time.

Mogen's experiments are being followed with suspense by interested parties. Mogen works partly on commission from third parties. It is clear that potato producers are very anxious to be able to sell the first transformed potatoes. The departments of agriculture and economic affairs also play a stimulating role in the background. The department of economic affairs recently gave Mogen a hefty subsidy for further research.

On the other hand, environmental experts have a skeptical attitude toward Mogen's urge for action.

We know far too little about the effects of genetic manipulation to unleash the altered plants into the open air already now. Also if we think that certain characteristics cannot freely propagate in other species, nature can change that via mutations. Just as in 1973 there was a temporary moratorium (thinking interval) for laboratories, there should now be a moratorium for field tests. Why not wait a few years? Then we would be better able to survey the consequences.

"Not Too Worried"

Across the street from Einstein Road in Leiden, Herman de Boer, biochemist at the state university, is holding his breath. De Boer worked for many years for the firm Genentech in the United States. He was one of the first who at the time revealed genes in the E-coli bacterium, the best-known workhorse of biotechnology.

As to the field test requested by Mogen, he says: "This is a very important step forward. We must not choke it in regulations. Humans have always improved plants through selection. Now we are helping nature a little. It is much faster than by way of the cross-pollination method. Because this is a new technique, we must be careful and do the first field tests under supervision. But we should not be too worried."

Now one is waiting for the nuisance act permit from the municipality of Dronten. If that comes about, and if the tests proceed favorably, then in a couple of years the consumer will be able to conjure up on the dinner table his teleshopped, electronically paid for and biotechnologically altered spuds from the microwave oven.

8700

COMPUTERS

EUREKA Project EAST To Market Applications Software

36980147c Paris AFP SCIENCES in French 23 Dec 87 p 22

[Unsigned article: "Second Phase of Eureka EAST Project Launched"]

[Text] Paris—The French Company for Software Engineering (SFGL), prime contractor for the EAST project, announced in a press release that the second phase of the project, which is expected to result in the creation of Software Engineering Works as part of Eureka, has begun.

It will lead to the marketing of the first "all-terrain" applications development software, meeting the European PCTE (Portable Common Tool Environment) standard in mid-1989. The economic interest group that was

formed among SFGL, Nokia (Finland), and Computer International (Denmark) for this project, could soon acquire a fourth partner, Italy.

In this case, France, which now finances 60 percent of the operation's total cost, estimated at 700 million francs, would transfer some of its financing share to Italy. Denmark and Finland would each retain 20 percent. SFGL, with a capital of five million francs and established in 1985, brings together the French enterprises which want to participate in the formulation of these computer applications development stations: Bull, CISI-Ingenierie, SEMA-METRA, SESA, and STERIA.

11023

ESPRIT HUFIT Information Technology Project Reviewed

3698m180 Turin MEDIA DUEMILA in Italian No 11, Dec 87 p 143

[Excerpts] Turin—Technological products must not be just technically satisfactory—they have to be "usable" too. As part of the EC's ESPRIT program, HUFIT (Human Factors in Information Technology) was set up to identify the most significant human factors in man-machine interaction, and then to "humanize" software products as much as possible. As part of the New Technologies show in Turin, HUFIT was introduced for the first time in Italy.

The project is directed by two prestigious specialized university centers (Stuttgart's Fraunhofer Institute and London's Loughborough University of Technology). Five European industries are also participating in the project: Bull-Transac (France), ICL (Britain), Olivetti (Italy), Philips (Netherlands), and Siemens (FRG).

HUFIT, launched in 1984, is now 4 years old. Its main objective is to give the European data processing industry the standards necessary for it to develop products that meet the requirements and expectations of a wide range of users. In other words, it is the designer who has to adapt himself to the customer, and not the other way around.

A study carried out on a large bank analyzed the effective use of the functions in an interactive information system for customers. Of the 36 commands available for retrieving information on checking accounts, 75 percent of the users used only four commands.

This is only one of the possible examples demonstrating that software is often left in the drawer in spite of the investments made to develop it, produce it, and introduce it into offices and corporations. There are two consequences of this: a wealth of information and resources is wasted, and often the technology itself is not understood at all.

HUFIT is based on the assumption that the human factor must be taken into account by design methodolgies. This project is intended to promote, coordinate, and implement a branch of scientific activity which, in Europe, is more theoretical than applied in nature, even though it has the highest number of researchers.

The human factors involve a wide range of activities and behavior, such as cognitive processes (gathering information, learning, and memory) and the operational interactions among the various roles.

The HUFIT program is subdivided into three sections. The first section handles the problem of the conception, design, and installation of computer products so that they take man into consideration. The second section studies the advantages and disadvantages of the various types of man-machine communication (talking, direct graphic manipulation, command languages, etc.). The third sector attempts to increase the awareness of the European information technology sector concerning human factors. Olivetti is working in the first area. The EC assigned this company the task of coordinating the study on the "usability" of products, or in other words their appropriateness for efficient and easy use. This requires manufacturers to follow certain standards in all phases of work, from product conception to the training of users.

The low level of "usability" found in certain products was seen to be the result of the distance between the place where it was conceived and developed, and the place of use. Under these conditions, the designer tends to be guided by technology. He has a vague, hazy picture of the user, of whom he constructs a model based on his own capabilities and culture. This is the typical defect of "technicism." No appropriate scientific methodology exists yet for the evaluation of just how "usable" or "unusable" a technology product is, and an urgent need for this is starting to be felt. This is where HUFIT's strategic nature comes in. Olivetti has set up its own in-house team, trained in psychology, data processing systems, ergonomics, and organization for the execution of a research program. The team has been at work for about 1 year now.

08801

Development of Italian OSI Project Evaluated

3698m192 Turin MEDIA DUEMILA in Italian No 11, Dec 87 pp 138-139

[Article by Nicoletta Castagni: "Computer Dialogue With the OSIRIDE Project"]

[Text] Rome. The first stage of the OSIRIDE (Open System Interconnection for Italian Heterogeneous Data Network) project launched by the CNR [National Research Council] in June last year, has been completed with a positive balance.

The results, described at a press conference, have in fact confirmed the validity of this difficult initiative promoted by the CNR with the aim of developing an interconnection system among different makes of computers.

The problem—felt primarily in technologically more advanced countries—of how to overcome dialogue difficulties generated by the incompatibility of computers is not a recent one, having emerged at the time when this country started to have a substantial number of data processing systems.

At international level, the ISO (International Organization for Standardization) defined an OSI (Open System Interconnection) model arranged in seven communication levels (from pure transmission to the dialogue among application programs); the network architecture of this model was such that it could act as a reference point to all the leading computer manufacturers, particularly those of large computers.

Italy acted on the initiative of the CNR, which aimed to develop a heterogeneous network, or, in other words, a network consisting of different makes of computers used by the CNR, universities, and Italian research centers. In this way, the OSIRIDE project, originally intended to rationalize and optimize the exchange of information in the research world, was transformed into a nationwide initiative.

In fact, the major computer manufacturers have taken an active part in this project, such as Digital Equipment, Olivetti, IBM Italia, Honeywell Bull, Tecsiel [Italian State-Owned Telephone Company] and SIP, the latter having made available the Itapac public package switching network, now accessible in the whole country. The first stage of the OSIRIDE project, called Interest, was carried out with close collaboration between the CNR and companies in order to verify the reliability of the software needed for interconnecting computers and making them able to communicate. The CNUCE Institute of Pisa, which since 1970 has conducted CNR research in computer networks and was entrusted by the CNR's General Committee for Data Processing with the production of the OSIRIDE project, coordinated and finalized the largest part of work. The CNUCE researchers, in fact, developed a special methodology whereby the software produced on the OSI model by the companies taking part in the project was made available to a number of users, and more precisely the CNR pilot centers operating at the CNUCE and at IASI in Rome, as well as those located in the universities of Palermo and Pavia.

The users who employed the software to communicate with each other verified operation and pointed out errors and drawbacks to the companies, which immediately make the necessary corrections in order to achieve full compatibility among the different machines.

Thanks to the synergy between the CNR and industry, the way also was opened in Italy for the interconnection of several thousand large computers which for years have been waiting to communicate. The investment required for starting this interconnection process among different makes of computers was very modest indeed—only 1 billion lire invested by the CNR, plus the work of its researchers for a total of 40 man-years.

This was not the case for the firms involved because they had to invest on an individual basis in order to develop the new network architectures. And, in this field, research requires massive resources. But the growing demand from a highly developed market for greater flexibility and integration of systems and machines has practically forced industry to find satisfactory solutions. However, with the start of the OSIRIDE project, companies found themselves in an excellent position to move toward standardization through use of the most advanced CNR centers as a testing ground for both the software and for a project that had made it possible for them to join together and cooperate, thanks primarily to the credibility of a public structure available to all in an attempt to increase research.

The second stage of OSIRIDE should start now. The objective of this second phase is to create an authentic exchange of information and messages among computers; the Hewlett Packard Company now wants to join the firms already involved in the project and is already testing its own OSI software. Financing for this stage of the project is still lacking but CNR Director Luigi Rossi Bernardi is totally committed to ensuring that this project goes ahead, despite the fact that the investment required will necessarily increase.

08707

DEFENSE INDUSTRIES

MBB of FRG Tests New Production Processes, Material for EFA

New Alloys, Forming Methods Used

36980139a Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 31 Dec 87 p 8

[Text] Frankfurt. Two fundamental innovations have been combined at the Augsburg plant of Messerschmitt-Boelkow-Blohm (MBB) into a premiere for fighter aircraft technology projects: progress in the process of stretch-forming integrally reinforced plates into sharply curved components with non-developable geometries, and the use of aluminum-lithium. The integral construction makes it possible to decrease the number of links and piece parts. Because of better density-stability ratios, aluminum alloys with lithium permit important decreases in aircraft weight, the company reports.

Based on the draft design model for the EFA (European Fighter Aircraft) project, the Jagdflugzeug 90, the individual air intake segments have two main functions. On the one hand, they form the air intake pipes that pass through almost the entire midsection of the airplane's fuselage, while on the other hand they serve in part as a wall for the fuselage integral tank. In order to diminish the risk of leakage, the intake segments should be as large as possible and the attachment elements should be largely diminished. In this case, the stretch-forming of integrally reinforced plates represents a valuable solution to problems of construction and production technology.

Because of its spherical geometry, the configuration of the air intake is not developable. The process was previously developed to a high level in conjunction with the Tornado program in Augsburg. The innovation with respect to EFA, however, has to do with the plan to use ribs to integrally reinforce the entire structural unit both longitudinally and transversely. Because of the geometry of the structural unit, an inclination of the stretch-form block or an angle between the rib and stretching direction results, which leads to a drift in the rib position. The practical focuses of the program were thus to develop production parameters for the deformation and heat treatment of the new aluminum-lithium material with structural units in the original size as well as to correct the geometric developed view in order to improve dimensional tolerance of the assembly unit.

The constructive handicap and the local variations in extension on the structural component necessitate iterative compensation. The integral indentations are worked out of 35 millimeter thick aluminum-lithium plates measuring one meter by two meters using special milling programs. This resulted in a structural base approximately five millimeters thick and root faces approximately 24 millimeters thick. For measurement purposes, a 50 by 50 millimeter grid fixed at the vertex line was positioned. The heat treatment that was now applied had been preceded by extensive preliminary tests with the new material: The goal of the accompanying trials was to find the most suitable heat-treatment state, since the ribs are in some places expanded by more than 20 percent through deformation, which is an extraordinary yield.

For aluminum-lithium, "solution heat treatment and quenching" were chosen as a starting point for the deformation experiments. Through this, the material demonstrated superior expansion behavior of up to around 28 percent. Distortion of the plates after quenching was compensated for through planishing. The radii were then preformed by "rocking," meaning a prebending of the free side of the plate to approximately 45 degrees by gradually feeding it onto a bending press. The critical step is the stretch-forming of the structural unit to its final contour. As further described in the company's in-house publication MBB AKTUELL, the final geometry of the structural unit is gradually "adjusted" over a stretching block in the stretch-form press, which requires a great deal of skill and experience.

After successful preliminary experiments using conventional aluminum alloy 2024, interest during the first stretch-forming experiment on structural units around 700 millimeters long and made of aluminum-lithium 8090 was focused on agreement between theory and practice: the dimensions of the ribs corresponding to calculations and the transferability of the physical stability values to real structural components. Even after the first test, it was possible to say that aluminum-lithium under the chosen circumstances possesses at least equally good, if not even better, deformation properties.

In contrast to the stretch-forming tests with conventional aluminum alloy, it was possible to carry out deformation without interim heat treatment, which in part has to do with the diminished hardening tendency of aluminum-lithium at room temperature and thus the longer processing time. Measurements of the structural unit yielded rib extensions caused by deformation of up to 12 millimeters, or 24 percent. There were no significant deviations in rib width from head to foot, although decreases in rib height of up to 2.5 millimeters were noted. Since the ribs are perpendicular to the surface of the component and deformation is carried out on an inclined stretching block, a possible tilt was discussed.

However, the angle of inclination of the rib axis to the normal, which was registered at two degrees, turned out to be extremely small. In order to position the ribs on the structural unit so that they conform to the airplane system, they must be milled on the even plate "sinusoidally," to a certain extent as waves. Further experiments were conducted in order to attempt to compensate for the deviations in the ribs through correcting the developed view. Based on previous results, an iteration step was conducted as an example. The flow of the ribs was concretely changed by measuring drift from the control position and then compensating by "allowing" in the target direction. The structural units were then subjected to a cracking test and aged warm in order to achieve the required physical material properties. Through chemical erosion, exemplary tests were then conducted on the final contour of the rib profile and of the surface of the structural unit.

New materials and advanced production processes make it possible to stretch-form integrally reinforced plates for air intake shells used in future aircraft programs. Because of this, a considerable decrease in the amount of attachment parts and components is possible, as well as a lessening of the risk of leakage from integral tanks, MBB reports. The aluminum-lithium structural unit resulted in a decrease in weight of 10 percent compared to a unit of identical geometry made of standard aluminum alloy. Applying the better physical properties of aluminum-lithium to the construction of structural units could potentially lead to significantly more achievements in the future.

12271

Large One-Piece EFA Fuselage Section

36980175 Munich-Ottobrunn MBB AKTUELL in German Dec 87 p 4

[Unattributed article: "One-Piece CFK Shell for Fuselage Mid-Section"]

[Text] Augsburg—In the development of production technology for primary structures from carbon-fiber-reinforced plastic [CFK] for the JF-90/EFA, an important milestone was reached at the Augsburg plant: For the first time, a one-piece CFK shell for the fuselage mid-section could be produced in the original configuration.

The equipment and production techniques developed in the last few years have proved themselves with these components, which are notable for their size and complexity. The CFK structure, which, with a weight of 128 kilograms, a length of 5 meters and a surface of 15 m^2 is the largest CFK structure at the present time in European fighter aircraft construction, essentially corresponds to the current configuration for the shell of the midsection of the JF-90/EFA's fuselage.

The important features of the building component, constructed primarily with a view to the greatest possible reduction of mass, are:

—a single-section, integral, reinforced-profile, non-unwindable CFK skin (half-cylindrical) with intergrated flanges, edge reinforcement and longitudinal stiffeners;

—an access plate fitted flush with the external contour, with cover plate supports integrated into the shell;

—the use of the fiber-matrix system (175 C-hardened, unidirectional carbon fiber prepreg) chosen for the prototype phase of the JF-90/EFA;

—the curing of the building component in an autoclave cycle (co-curing) into the finished dimensions (net molding);

—an integrated lightning protection system.

To produce the components, equipment and manufacturing technologies were used which had been developed in a series of technology programs. The most prominent ones are:

—CFK curing equipment for the shell,

—semiflexible tools for the heat-forming and curing of the profile (together with the skin)

—level folding and subsequent heat forming of the CFK profile to achieve finished dimensions,

—the folding of the spherical CFK skin.

Although at present the production technique is still characterized by manual activities, it permits a simple and comprehensive transition to a mechanized and automated solution. This will assure that in the future the method will be reproducible on a high quality level as well as economically efficient. The production technique, intended to reduce waste in large-scale production, already allowed for an 80-percent material utilization when the first piece was produced, a figure which is indispensable in view of the high material cost and can be even further improved with mechanized production.

Nondestructive tests and measurement controls undertaken at the time confirm the usefulness of the equipment and production concept applied to similar primary CFK structures which have large surfaces and are complex and highly integrated. Both with respect to laminate quality, position tolerance of the profile and regarding the geometry of the skin (in particular in the support region for the internal structure of the fuselage), it was possible to meet the demands that were imposed.

Proving that it is possible to make a one-piece CFK shell, which shows a 24 percent reduction in mass as compared to a similar aluminum structure, is an important step in the attempt to reduce the structural mass of the JF- 90. At the same time, the compromise achieved between production and construction requirements opens the door to economically efficient manufacturing.

11949

New Production Methods for France's Next-Generation Nuclear Sub

36980169 Paris L'USINE NOUVELLE (supplement) in French 14 Jan 88 pp 8, 9

[Article by Jean-Pierre Casamayou: "The Secret Weapons of the Cherbourg Dockyard"]

[Text] To ensure that the new-generation missile-launching submarine is launched in 1992, Fr2.3 billion will be invested in the Cherbourg shipbuilding yard to make it the most modern naval dockyard in the world, with respect to both machine-tools and production processes.

Cherbourg is preparing for action. The 4,800 people working at the dockyard are getting ready to build the future new-generation missile-launching submarines (the SNLE-NG). These submarines will be bigger (14,000 tons of displacement instead of 9,000), longer (150 m instead of 128) and, above all, much quieter than the SNLE of the previous generation. They must now be built at the rate of 1 every 24 months, which accounts for the modernization of the old dockyard built by Napoleon.

"An exceptional submarine deserves exceptional resources," Dominique Castellan, head of the Cherbourg shipbuilding yard, exclaimed proudly. Modernization of the workshops started in 1981 and will be completed in

1992. It will proceed in three stages: setting up the new "hull" workshop that was just placed into service [photo p 8, not reproduced]. After that, it will be the turn of the shipbuilding and launching yards [drawing p 9, not reproduced]. All that will represent a total investment of Fr2.3 billion, which will make the DCAN [Directorate for Naval Weapons and Shipbuilding] facilities the most modern shipbuilding yard in the world.

The first large-scale operation was to gain 5 hectares over the sea, so that it will be the largest industrial area in France (4 hectares). This is the "hull" workshop, which consists of 7 main halls 40 m wide and 32 m high. One for CAD/CAM, three to manufacture parts, and three to form the frames and bulkheads. They represent 5 years of work and an investment of Fr900 million—including Fr300 million for machine-tools—with a total personnel of 500.

A French First

The large machines that equip this workshop have unique characteristics. Next to the traditional roll-forming, cutting, chamfering and such machines, the Cherbourg dockyard has acquired three machines of which it is very proud. Machines specially designed to work the new high yield-strength steel developed by Creusot-Loire Industrie, the 100-HLES. The most impressive machine is the 12,000-ton press designed for the cold-forming of bulkheads thicker than 120 mm. Developed by Clecim, a subsidiary of Spie-Batignolles, this vertical reverse-action press is equipped with a computer-aided control that is unique in France and it is one of the very best presses in Europe. To machine the heavy hull components, the workshop uses a large-capacity machine supplied by a group consisting of Berthiez Saint-Etienne and the German Schiess-Froriep. The most powerful such machine in France and the third in Europe, it can turn, mill, and bore parts with diameters of up to 13 m and weighing up to 400 tons. Two impressive characteristics: 1.5 tons of chips per hour, and a 12-axis numerical control (with simultaneous movement along 5 of the axes). Last but not least, a horizontal four-roller roll-forming machine. Built by the Swiss company Hauesler, it is also the third most powerful such machine in Europe. It is used for the cold forming of sheet metal up to 120 mm thick which is used for the components of the thick submarine hull. These three exceptional machines are used to machine the components used to build the sections of the submarine.

Once cut out and formed, these metallic parts are placed on one of the five vertical-axis assembly frames and assembled into sections. These cylindrical hull sections have the same diameter as the submarine (about 13 m) and are about 3 m long. Assembly proper consists in welding the plating sheets to one another, and then welding the frame on the plating; automatic welding processes are used (pulsed metallic inert gas welding; narrow-gap welding). Once fabricated, these sections (1 submarine will require about 30) are welded to one another to form the 5 sections of the SNLE-NG.

This construction method, section by section, represents in itself a revolution in submarine construction. Until now, submarines were built in the traditional manner, like any other ship: a complete hull was erected on an inclined plane that could be used for launching. The drawbacks were that huge openings had to be made in the hull in order to install the equipment (nuclear plant, weapon systems, etc.) and that it was difficult to work in a confined environment...and on an inclined plane. With the section method, all these problems have been eliminated!

Productivity: A 30-Percent Increase

Each section, 10-45 m long, will be equipped separately. The front section houses the sonar and torpedo launching tubes; the engine section, the nuclear plant and its steam generators, etc. Then, the five equipped sections are welded together—through an automatic process—to form the complete submarine. As a result, manufacturing time has been halved and productivity increased by over 30 percent.

To make these assemblies, the Cherbourg DCAN is building two halls, 140 m and 190 m long and over 50 m high, on the site of the slipways dating back to the 19th century. This "Beaubourg-on-the-Sea," as the people of Cherbourg already call it, because of its colors and its original architecture, will be placed into service over a 2-year period starting this year.

However, this horizontal construction system has one major drawback: how to transfer equipped sections (weighing several thousand tons) and, above all, how to launch the ship. The project design engineers have found a clever solution: a system of "walkers" that can move loads of up to 400 tons. About 40 of these transfer devices, developed with the help of the Norwegians, will make it possible to move the 14,000 tons of the submarine to a platform that can be submerged into a dock. Construction of the launching device will start in the second half of the year. And if everything proceeds on schedule, the new SNLE will be launched in 1992.

Photo Captions

1. p 9. The launching setup. The 14,000-ton submarine is placed on a submersible platform by some 40 "walkers" with a capacity of 400 tons each and moving at the rate of 1 m per second.

9294

New French Lab To Develop Next Generation IR Sensors for Missiles

36980152a Paris ELECTRONIQUE ACTUALITES in French 22 Jan 88 pp 1, 12

[Excerpts] Grenoble—On 15 January Alain Carignon, mayor of Grenoble and minister delegate in charge of the environment, and Jean-Louis Teszner, director general of SOFRADIR [French Infrared Sensor Company], opened the Veurey-Voroize development center near Grenoble. This center is involved in the development of infrared CCD [charge coupled device] retinas for military applications (and, if needed, for space purposes).

It uses the special experience of the three SOFRADIR shareholders, namely the SAT [Telecommunications Corporation] (a 40 percent shareholder), providing its experience in cryostatics; Thomson-CSF (a 40 percent shareholder), providing its experience in CCD's; and LETI [Electronic and Data Process Technology Laboratory] (20 percent), making its contribution through LIR [Instruments and Radionavigation Laboratory] in the technique of developing so-called "flip chips," which combine surfaces for detection and CCD reading.

In this way a line of development has been initiated, using equipment developed by Calma, with Nanomask making the masks and with Thomson Saint-Egreve providing the silicon wafers.

Fr80 Million in Revenue in 1990

The SOFRADIR Center, at a cost of Fr75 million, is relying on studies made by the Ministry of Defense and on the beginning phases of contracts entered into with the equipment suppliers which wish to have prototypes. Total sales forecast for 1987 amount to Fr50 million, Fr70 million in 1988, and Fr80 million in 1990. While still in the development phase, a production factory should be completed in 1994/1995 in Poitiers.

The AC3G will then be produced at a rate of 500 to 1,000 units per month, and at the rate of some tens of units to 200 per year under the present program for producing prototypes which involves 38 persons (the future unit will employ 200 persons.).

Regarding markets, the sensors will be included in the program for the construction of the Franco-German antitank helicopter.

Transfer of Technology to AEG

Furthermore, a technological agreement has been signed between SOFRADIR and AEG-Telefunken, under which the German company will reportedly manufacture under license the various items of equipment developed by SOFRADIR at Veurey. The transfer of technology will take place in the course of 1988. Teams from the German company are expected to come to SOFRADIR itself for training. This agreement is part of a 50/50 Franco-German cooperation in which the equipment is to be produced in equal amounts by the partners over the long run. However, it should be noted that CCD sensors are not part of the agreement and that AEG will be able to choose whatever company it finds suitable—initially it will buy CCD sensors from Thomson. These CCD sensors will be produced at Thomson for multiplex applications.

To meet the demand arising from this program, SOFRADIR is developing sensors with 1,200 sensitive points, allowing ranges of 3 to 4 kilometers (compared to 300 meters previously). The new sensor will be based on research work done by LETI, which is about to announce sensors with 15,000 sensitive points and expects to develop develop components with 160,000 sensitive points.

Toward 500 X 500 Infrared Components at LIR

LIR is a department of LETI. Employing 16 persons, it is engaged in "upstream" research which the DGA (Delegation General de l'Armament—Delegation General of Armaments) determines in large part. LIR thus developed the C3G and has undertaken a program involving hybridizations on larger surfaces and with greater resolution (256 X 256 at a scale of 5 μm). Previous, fixed matrices were of the 32 X 32 type or mosaics with 2,000 points.

Linear bars are also under study, as well as the possibility of work at wave lengths above 12.5 μm to develop high-performance sensors.

A second area of study also ceneters on the basis of research into the potential of the material silicon/platinum. In particular, monolithic structures "in the same plane" are under study. This would facilitate factory production since the "flip-chip" process, using indium balls, has the disadvantage of the number of steps and the extreme meticulousness which it requires. However, the use of this material raises a problem on the detection side (it is 50 to 100 times less effective than HgCdTe). It should be noted that, according to Mr Amingual of LIR, the same monolithic axis for HgCdTe is under study and should lead to successful development in 5 to 10 years. The problem of this material, as distinct from silicon-/platinum, is that it does not have adequate electrical characteristics. Research is also going on, aimed at achieving larger chips (2" X 3", compared to 1" X 1" at present).

Finally, Mr Amingual told us that research was also under way for the development of sensors with a large number of sensitive points suitable for operation at ambient temperatures, which would make it possible to minimize the noise of the component itself.

05170

FACTORY AUTOMATION, ROBOTICS

EUREKA's 'FAMOS' FMS Projects Approved

36980117 Barcelona REVISTA DE ROBOTICA in Spanish Oct 87 p 59

[Excerpt] The meeting in Madrid of the Fifth Ministerial Conference of Eureka coincided with the celebration of Tecnova 87. One of the items on the agenda was the approval of seven FAMOS projects, chosen from the 100 already submitted, that have gone beyond the analysis stage and are now definite FAMOS projects. Dedicated to the improvement of European technology in the field of flexible automated assembly, FAMOS has become the most important group of projects within Eureka.

Seven Projects Approved

The ministerial conference in Madrid formally approved seven projects that are already on the way to realization and subsequent evaluation.

Federal Republic of Germany: Robert Bosch Ltd.

With the collaboration of the Italian firm B Ticino, Robert Bosch has embarked on a project that should be in operation within 4 or 5 years and whose approximate cost has been estimated at 10.6 million ECU [European Currency Units].

Its aim is the development of components of flexible assembly systems through CIM [Computer Integrated Manufacturing] with the purpose of reducing stocks and the volume of the jobs in process. The pilot plant that will emerge from the project will incorporate automated assembly cells and will improve the areas of manual assembly and the flow of information as well as materials.

The main technologies to be developed are: the implementation of robotics and automated plants in general; ergonomical and efficient arrangement of the necessary manual operations; disposition of products by means of intelligent systems of transportation; control and information networks employing artificial intelligence packages.

Spain: Standard Electrica, S.A.

This is one of the projects in which the directing company is Spanish. Principal collaborators are Alcatel, Taylor Hitec and Centunion, the latter also Spanish. The implementation period in this case is 25 months, with a cost of 3.5 million ECU.

The project is very specific: the objective is to produce a flexible manufacturing cell for the assembly of telephone devices. Very advanced models of digital telephones will be manufactured in an integrated manufacturing plant that will receive the components for the devices and install them in automated assembly lines and in manual assembly areas. The entire process will be strictly controlled by a network compatible with MAP [Manufacturing Automation Protocol], optimized with intelligent systems for simulation and disposition of parts.

France and Spain: Philips and Fagor

This is a case in which two competitive firms are collaborating, insamuch as Philips as well as Fagor are engaged in producing white line household appliances. It is a very ambitious project, from which a factory for automatic washers should emerge. Due to its complexity, the period of execution is divided into three separate vaguely defined terms estimated to last from 2 to 4 years. The cost, originally calculated at 406 million ECU, has been increased subsequently. Primary collaborators will be Ikerlan of Spain, Dea of Italy, the well known institute IP of Stuttgart, and the British engineering firm Systems Designers.

Due to its magnitude the project has been divided into four subprojects that correspond to assembly lines for the production of subassemblies which will be combined to form the washer: the first will manufacture the frames and covers from sheet metal; the second will produce the washing mechanism itself, including the tank, drum and motor; the third will do the wiring and the last corresponds to a continuous visual inspection line. Robotics, automatically guided vehicles, sensors, and communication networks are the main technical aspects to be developed in this project.

France: Merlin Gerin

The objective in this case is the integration of high-velocity automatic assembly machines, which should be carried out within a four- or five-year period and for which 7.9 million ECU will be invested. Two Spanish firms will be collaborating: the above mentioned Centunion, and Serra Soldadura; also participating are the French firm ITMI, the Italian Nesarteam and, singularly, Isemca, a company of Switzerland, a country outside the group comprising FAMOS.

The purpose is to develop new assembly lines for automatically placing small parts in electrical units of various sizes while maintaining high productivity. The first application will be in the production of switches at Merlin Gerin factories, including those in Spain. For this, technical problems relating to soldering, automatic insertion, vision systems, automatic laser tests, local networks software protocols, and communication systems will have to be solved.

Great Britain: Perkins Engines Limited

The British motor manufacturer Perkins enjoys the collaboration of three other British firms: Istel, IBM and P.A. Technology, and that of the Italian firm Babcock Fata. It is estimated that the project will take three years to complete, with an estimated cost of 10 million ECU,

and that the final result should be a flexible installation of large capacity, highly diversified in regard to the products to be assembled and adequate for motors and transmissions.

The objective is very interesting: 80% of the company's present production, 600 motors daily, falls in the medium-size range. Each client requires slight variations, sometimes strictly cosmetic, and to economically satisfy those demands, Perkins has proposed to automate the incorporation of such adaptations, which must be carried out while working at high speed. For this it has already gained experience in its own plants, but now it must pursue broader and more difficult objectives, mainly through the use of automatically guided vehicles [AGV], by automating the selection, supply, location and assembly of mechanical components, and the creation of a complex system for the management of machines, cells, and lines relying on artificial intelligence for its control.

Italy: Telettra S.p.A.

Once more a case of collaboration between companies that are at least partially competitors, since Telettra's collaborator here is Plessey, the British firm whose specialty is telecommunications. The project has a budget of 34.5 million ECU and the completion period is four years.

Telettra also operates in the field of telecommunications and produces millions of printed Circuit board assemblies per year. Like Plessey, Telettra is already using automatic assembly machines, CAD [Computer Aided Design] and management systems connected to central computers, and other advanced technologies. Nevertheless, it is now trying to go one step further with the integration of the various systems, which involve the above mentioned technologies of robotics, vision, sensors, automatic manipulation and transport, local networks, communication protocols, etc.

Italy: F.I.A.R.

Along with two other Italian firms, Prima Industry and Zanussi Electromeccanica, the Swedish Electrolux and the Austrian Verdichter O.E., this Italian manufacturer of compressors for refrigerators has obtained approval for a project valued at 15 million ECU that must be completed at the end of three to four years. It is very experienced in this field, inasmuch as it participates in various European CIM projects and has developed robots and vision systems to fulfill its own needs. Now it is trying to produce a flexible cell for the complete assembly of its refrigerators.

The main difficulty arises from the narrow tolerances that apply to the working elements of the compressors, which are installed by selected pairs for economic reasons. Hence the need for a system to monitor and control the flow of parts in real time. This necessitates having an on-line inspection system connected to an intelligent central control. Therefore the technological priorities of the projects are for advanced sensors, artificial intelligence and communication network systems.

The FAMOS of the 90's

It is clear that one of FAMOS' key words is collaboration. Collaboration among companies and institutes from various countries and even among competing enterprises.

For the seven cases described, as well as for those that will be approved, the next phase is the establishment and evaluation of the systems during production. From 40 to 50 advanced assembly systems should be distributed throughout Europe, for which it is calculated that no less than 645 million ECU will be needed. It is expected that other countries participating in Eureka will join FAMOS, so that the large-scale application of its results—since the idea is not to keep only the simple installations that are the immediate results of these projects—will permit facing the competition from outside Europe. It is evident that Japan and the United States are working in the same direction and perhaps with even more effort. But is no less evident that this is the only type of option left to Europe.

09907

ESPRIT's CIM Project at Elsag in Genoa

36980192e Milan TECNOLOGIE MECCANICHE in Italian Oct 87 p 207

[Text] A major experimental center on the European level is in the development stage at the Elsag plant in Genoa. The development of the center is being supported by the European Community in the context of the Esprit program of financing technological innovation.

The center's objective is to establish a laboratory for development and testing of hardware and software models, incorporated in a "multivendor" architecture that is flexible according to requirements.

The following companies and universities, in addition to the prime contractor Elsag, have been enlisted to carry out the project: for Belgium-Netherlands, Philips; for France, Sesa; for Germany, the University of Aachen; and for Italy, Aeritalia of Turin and the Polytechnic and Machine Tool Institute of the CNR in Milan.

The installation, which will reproduce the real conditions of a workshop for flexible production of mechanical parts, will be composed of the following: an island for machining of prismatic parts, a turning unit, a flexible assembly unit, a parts magazine, a tools preparation station, a station for visual recognition of parts, wire-guided conveyors, and robots for handling of parts and tools.

The data processing architecture will make it possible to perform in an integrated way the main tactical-operative functions of a manufacturing plant, that is: design of the product and process, integrated management of data, planning of production, and real-time control of the process.

Communication in the context of the architecture, which will use the Elsa 5000 control system at the unit level, will be carried out with the standard MAP and TOP in a multisupplier environment, open to subsequent changes.

What is involved is an advanced experimental plant for factory automation that integrates leading-edge technology in the field of mechanics, robotics and data processing so as to enable practical experimentation and training purposes, with accessibility by the center to the European plants and organizations interested in on-site testing of the possible problems of industrial automation.

9920

Italy's Rambaudi To Sell Machine Tools to McDonnell Douglas

36980192d Milan TECNOLOGIE MECCANICHE in Italian Oct 87 p 207

[Text] Rambaudi will supply machine tools to McDonnell Douglas of Long Beach totaling about $7 million.

These will be Gantry-type milling machines, with digital control of mobile portal and shaft, with heads having five controlled spindles.

These machines are designed and produced entirely by Rambaudi, and incorporate some advanced technological innovations in the important and sophisticated field of aviation machining. The Rambaudi machines will be installed in the McDonnell Douglas plants in Long Beach (CA) and will be used to produce parts of the new C17 cargo plane.

This is an important and significant success for Italian technology in an advanced sector, and confirms the high specialization achieved by Rambaudi in this sector, which, along with machinery to produce dies, is the company's main production activity.

9920

France Researches 3-D Vision System for Robots

36980185 Paris L'USINE NOUVELLE in French 4 Feb 88 pp 46-47

[Article by Thierry Lucas: "3-D Vision for Tomorrow's Robots"]

[Excerpts] There are two methods to obtain 3-D vision. The first laser-based sensors are beginning to be used in production control. Soon, multi-camera systems will provide full autonomy to mobile robots.

The new technician that the IBM factory in Montpellier is about to receive looks different; it is a mobile service robot developed by the LAAS researchers (the CNRS Laboratory for Automation and Systems Analysis in Toulouse) and built by the Midi Robots company. As soon as it is received, it will undergo a series of tests to evaluate its capacity to perform random parts transfers in a workshop.

To "navigate" independently, a mobile robot should ideally know its environment in detail and be capable of analyzing the scenes it meets as it moves about. The model supplied to IBM is not that well endowed; still, its ultrasonic sensors and laser telemeters will enable it to perceive distances, detect obstacles or follow a wall. To receive full autonomy, it will have to wait until genuine 3-D vision systems are available. These systems are the subject of active research that will revolutionize vision applications in the next few years.

According to Raja Chatila, LAAS researcher in charge of the Hilare mobile robot project, "a major obstacle to the use of 3-D vision is the time it takes to compute images." Indeed, the principle of 3-D vision is based on the observation of a scene by several cameras using different angles; the images of a given point on the object are then compared to compute its position in space.

This method uses pairing algorithms which, applied to a large number of data, require so much processing time that they cannot be used for the applications considered. One solution consists in pairing line segments instead of points, e.g., line segments along a characteristic contour. This is the method that the LAAS has chosen for its software, developed on a Sun station and eventually to be used on the Hilare robot.

In the context of research carried out at the CRIN (Nancy Data-Processing Research Center), Brigitte Wrobel proposes to build 3-D surfaces, this time by pairing regions, i.e., zones of points presenting a certain uniformity. These results are a contribution to another mobile robot vision system project, Orasis, carried out jointly with the INRIA (National Institute for Research on Data Processing and Automation).

To speed up pairing, colors can be taken into account, e.g., for faster identification of surface discontinuities. At the LIFIA (Laboratory for Basic Data Processing and Artificial Intelligence, in Grenoble), where some 30 researchers are working on robotics, vision and artificial intelligence, Yves Demazeau has developed an electric-wire identification and localization system in order to automate the insertion of wires into cables. "Since wires are flexible," he pointed out, "traditional shape-recognition methods are not suitable. On the other hand, wire identification requires color vision, which has the advantage of speeding up the matching of 3-D images."

A French cable manufacturer in very much interested in this system. In the meantime, the LIFIA is tackling other "advanced" subjects, in particular with shape-recognition studies in which reflections on a surface are monitored while the sensor is moving!

Actually, taking into account additional information such as color or contour detection is also a way of improving pairing accuracy and eliminating ambiguities. In the same perspective, many 3-D vision systems now use a third camera. Thus, the algorithm developed by Francis Lustman and Nicolas Ayache at the INRIA uses the third image to validate the tentative pairing obtained with the first two images. Based on this research, algorithms will be developed for the Orasis mobile robot project.

While the INRIA tends to emphasize 3-D vision problems, the key concept of the Hilare-II project of the LAAS is "multisensor combination"; the robot now being built under a DRET [Directorate of Research, Studies and Technology] contract will use simultaneously ultrasonic sensors (for their rapidity in detecting obstacles), laser telemeters (for accurate distance measurements) and cameras. The objective of this assembly is to combine the data provided by the various sensors to arrive at an accurate and consistent representation of the environment in which the robot will operate. This is an ambitious program, for which the computing capacity of Hilare was boosted to make it capable of reflex reactions, and also of modifying its program more extensively should it meet something unexpected, e.g., a closed door...

3-D Laser Measurements: Products and Applications

Laser-based 3-D vision sensors were the first to be produced by laboratories. Several companies are now marketing products of this type. The sensor marketed by ITMI [Intelligent Machine Industry and Technology] (which originated at the Grenoble LIFIA) actually uses a light plane obtained by placing a cylindrical lens behind the laser. The system installed at Merlin Gerin has been used since January 1986 for quality control on a circuit-breaker assembly line. In this case, angular measurements are made with a precision better than one tenth of a degree.

The Videolaser sensor of the 3-D Vision company, the result of research carried out at the National Advanced School for Telecommunications, was first used to create digital models of mockups or real objects, to be used for CAD and image synthesis. Installed on a PC-AT size board, the system can acquire one million points in less than one minute. Among its quality control applications, a project concerning turbine blades is being studied jointly with SNECMA [National Aircraft Engine Study and Manufacturing Company]. Inspection will have to take place under "tense flow" conditions, which implies that control will be performed within a few tens of seconds. On the laser video models announced for 1988, the sensor will be carried by a six-axis robot.

Research on the subject will not stop at these first applications of "active" 3-D vision. At the INRIA (whose "Profile" 3-D sensor is now manufactured by Digital Design), research is done on the identification of 3-D parts contained in a bin. As for the LIFIA "vision" team, it is reviving studies on the 3-D modelling of objects using an experimental bench which provides enhanced integration conditions, closer to industrial requirements.

9294

Ansaldo CIM Pilot Project Outlined

3698m181 Turin MEDIA DUEMILA in Italian No 11, Dec 87 pp 132-133

[Excerpts] Trieste—It is the pilot version of something that could be a routine procedure in the future, the first step toward a complete restructuring of the production process. It is called CIM, which stands for Computer Integrated Manufacturing. To present the [CIM] project, technical personnel and experts in the sector came to Trieste for a meeting on 3 November hosted by some of the major representatives of the firms sponsoring the conference, namely: Steve (IRI) [Institute for the Reconstruction of Industry] planning and control chief); Glisenti and Micheletta (respectively Finmeccanica president and financial director); Clavarino and Musso (Ansaldo president and managing director); and Pavesi (Honeywell Bull Italia's managing director).

In the wake of last year's MAIS study (on information systems and industrial automation), IRI organized this meeting in Trieste specifically for heads of operations and production and information systems managers in the companies in the IRI Group, within the framework of the initiative "Special Projects with the Leading Data Processing Technology Suppliers."

The reason for the meeting was to discuss the general approach adopted by Ansaldo together with Honeywell Bull and ITP Inc. (the automation company specializing in system integration and represented at the meeting by managing director Quagliata) within the CIM project for Ansaldo Componenti's Monfalcone plant. Ansaldo Componenti forms part of the Ansaldo Group and has sales of 800 billion [lire] and a payroll of 7,500.

The Ansaldo firm plays an essential role in the CIM project's strategic plan, in connection both with innovations in production processes and with product innovation, while the Italian division of Honeywell Bull (the data processing multinational jointly owned by American, European, and Japanese shareholders) designed and

installed in the Monflacone pilot plant an integrated communications platform for the entire plant and developed management modules for an automated warehouse.

The CIM project for the Monfalcone plant (with 600 employees producing medium to large electric motors and generators) is a pilot version and a concrete example of integration of every area of the information flow, from the production of estimates to delivery of the product. The project will cost approximately 5 billion [lire] over a 3-year period and is expected to produce savings in the product cost (7 percent, or 4 billion [lire] a year) and reductions in delivery times (20 percent).

Ansaldo's CIM process, on the other hand, offers major possibilities for developing know-how and new products with its technological partners, in this case Honeywell Bull and ITP. Pavesi, Honeywell Bull Italia's managing director, said that: "It is precisely the link with Honeywell Bull that has made it possible to develop common products such as the integrated system for automated warehousing."

This integrated system for automated warehousing [known as] (SGAM) is of great interest. It consists of a software platform with an integrated design that makes it a low-cost, adaptable solution for a variety of different requirements in terms of services and hardware for warehouse automation. It is expandable to meet different situations in terms of automation and integration with other software products. The system's major objectives include: the automated control of warehouse input and output; to provide employees with the ability to control, verify, and change loading units; monitoring of the warehouse maps of automated areas and ground areas; and to interface an advanced processing system to integrate warehouse management with overall factory management.

But warehouse automation is only one of the possible applications of the CIM project which, we should remember, is moving in two different directions: first, customized products with high costs and long transit times (such as boilers, turbines, etc.), and second, items produced in batches, which have shorter transit times (engines and transformers).

The project, broken down into at least 100 major subprojects, will cost approximately 50 billion [lire] spread over 6 years, but the expected advantages of cost savings and reductions in product cost and delivery times are expected to cover these costs over a relatively short period. The project as a whole appears to be moving at a satisfactory pace, as was pointed out at the meeting and during the subsequent plant visit, particularly when one considers that in approximately 18 months "all areas have been involved in the project and innovative concepts such as design process automation have been accepted and tested successfully in the field."

In fact, part of the savings has already been obtained. A system to monitor cost savings, based primarily on efficiency measures not strictly linked to financial considerations, is now being studied, so that operation can be monitored against set objectives.

08615

INDUSTRIAL AUTOMATION

British To Invest Heavily in Advanced Engineering R&D

3698a148 Paris CPE BULLETIN in French Dec 87 p 24

[Article signed R.B.: "Joint Research Program Announced by SERC and CEGB"]

[Text] On 19 November 1987, the SERC [Science and Engineering Council] and the CEGB [Central Electricity Generating Board] decided to invest 1.35 million pounds in British universities for conducting engineering research. This agreement will prolong the 4-year-old joint research program by another 3 years.

The SERC and the CEGB will invest 350,000 pounds in 1988 and 500,000 pounds in 1989 and 1990 respectively. The amounts allocated in 1987 reach 242,000 pounds.

Priority is given to four sectors:

- electrical control systems,

- computerization of fluid dynamics,

- techniques for fault anticipation in materials,

- non-destructive testing.

25063

LASERS, SENSORS, OPTICS

Philips Develops Light Modulator Made of III-V Compounds

36980138a Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 29 Dec 87 p 8

[Article by re: "Gallium-Arsenide-Based Light Modulators"]

[Text] Frankfurt—The very fast modulation of a light source (laser) in the gigahertz region makes it possible to utilize fully the traffic handling capability through optical fibers. However, direct modulation in the resonator of the laser meets with numerous difficulties such as instabilities, displacement of the wavelength, the expansion of the maximum of the laser emission and many others. A solution consists in utilizing a continuous laser together with an external modulator. The Laboratories

d'Electronique et de Physique Applique (LEP) belonging to the Philips group have created such a modulator on substrates of the III-V combinations (gallium-arsenide, indium-phosphide). According to Philips' presentation, these combinations allow for the integration of the modulator with other electronic and electro-opical components.

The modulators have the structure of a Mach-Zehnder interferometer. The intensity modulation rests on the following principle: The single-mode laser beam is split into two beams of equal intensity and the phase of one of the two beams is modulated by an electric field, whereby use is made of the electro-optical properties of the III-V semiconductor. Both clusters are then combined and brought to interference. The interference pattern is converted into an intensity modulation with a passive element that acts as a mode filter. The mode filter and the beam splitter are formed out of three parallel coupled microstrips. They consist of gallium-arsenide on a substrate of doped gallium-arsenide or of indium-phosphide on a substrate of doped indium-phosphide and are produced by means of chemical vapor epitaxy with a special structure.

This structure is completely flat, which is advantageous for a continuing monolithic integration, as Philips reports. The drive voltage of the modulator lies between minus 10 and minus 15 volts. In the normal mode of operation the electrode capacity limits the bandwidth to a few gigahertz. But with special forms of electrodes, advancing waves can be used to modulate the interferometer. In this case the hyperfrequency wave on the control electrode is quasi-synchronous with the guided beam of rays, so that very high boundary frequencies can be achieved. By using waveguides with a heterostructure it should be possible to improve the degree of efficiency of the modulators and lower the drive voltage, it is also said.

11949

Fiberoptic Waveguide Made by Schott in FRG

36980138b Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURICH DIE WIRTSCHAFT in German 29 Dec 87 p 8

[Excerpts from article by khl: "Flexible Light Guides Make Application of Laser Systems Mobile"]

[Text] Frankfurt—Schott Glassworks in Mainz has developed flexible LG light guides for physical measurement techniques. They are to make the laser systems mobile, easy to maintain, compact and insensitive to environmental effects. One example of an application for the flexible LG light guides is holographic material testing. The optical properties of a light waveguide are determined by the materials and the dimensions of the light waveguide core and mantle. The index of refraction of the core material is higher than that of the mantle material.

Single mode waveguides have a core diameter of about 10 micrometers for a wavelength of 1.3 micrometers and about 4 micrometers for a wavelength of 0.488 micrometers. Among the properties of the single mode waveguide are coherent transport of the laser beam, stable intensity distribution on the output side even when the waveguide state is affected (such as by bending), and the best possible focusing. Furthermore, high modes of the laser, such as occur particularly for high laser output, are filtered out.

As is further reported by diplomate engineer Noboru Kobayashi of the central section for research and development of the Schott Glassworks in the internal publication SCHOTTINFORMATION, with LG light guides the single mode waveguide is enclosed in a protective sleeve which consists of a high- quality steel spiral with glass filament braid and silicone encasement. The ends of the light waveguide are equipped with high-precision plugs. The input and output coupling optics are integral components of the plug. Integrating the input and output coupling optics with the optical plugs has advantages, among them that the optical plug is preadjusted in production. Also, the end faces of the light waveguide are protected against the environment. That is important when high capacities are being transmitted.

If for example an optical power of one watt is sent through a single mode waveguide, the power density in the wave-transmitting core amounts to about 8 megawatts per square centimeter. If only a tiny speck of dust were to soil the end face of the light waveguide, it would burn up immediately and destroy the outer surface of the light waveguide. It is also an advantage that, based on the integrated coupling optics, the laser light can be coupled into the LG light guide with high efficiency without additional optics. Through the matched output coupling optics integrated into the plug, the light beam also leaves the LG light guide as parallel light.

So far two types of LG light waveguides have been developed, corresponding to the input wavelength ranges of 488 to 514 nanometers for the argon laser and 633 nanometers for the helium-neon laser (HeNe laser). LG light guides for other wavelengths in the range from 400 to 1,600 nanometers can also be produced. The input and output coupling optics are preadjusted, and transmission is greater than 50 percent. A beam diameter of 0.7 millimeters (He Ne laser) and 1.2 millimeters (argon laser), respectively, has thereby been assumed, for which the optics have been optimized. Higher transmissions, as well as use with other beam diameters, are said to be possible.

LG light guides are suitable, for instance, for transmitting coherent light from a fixed laser facility to an experimental table, as well as for application of laser light under extreme conditions, such as high or low temperatures, high electric and magnetic field intensities, dust, dirt, humidity and mechanical vibration. LG light guides enable profitable utilization of costly laser

facilities in parallel or in sequence at different places without moving the position of the laser facility. Application areas for LG light guides are holography, laser-doppler anemometry (LDA), laser microscopy, interferometry, physical and chemical measurement technology, industrial robots, laser shows as well as physics experiments in school education.

11949

BMFT Issues Bid for Laser Technology Projects

3698m159 Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 469/470, 16 Dec 87 pp 10-11

[BMFT announcement of subsidies available for joint projects within the framework of the "laser research and technology" priority program; issued in Bonn on 12 November 1987]

[Excerpt] 1. Within the subsidy program of the Federal Ministry for Research and Technology (BMFT), "laser research and technology," subsidies are to be provided for projects concerning joint industrial research for the solution of future-oriented problems common to many companies in the field of basic methods for materials processing using lasers. This includes research characterized by high risk, high complexity, and high overall costs, which require multidisciplinary procedures and which must be carried out through cooperation and division of labor between companies and research institutes.

2. The FRG Minister for Research and Technology hereby publishes notice of subsidies provided for the following joint projects:

2.1 Welding With High Performance CO_2 Lasers

This joint project mainly focuses on the development of basic methods for laser beam welding of metals using modern CO_2 lasers with a power ranging from 1019 kW, in the following fields in particular:

—Laser beam welding with or without additional materials;

—Welding of metal parts, especially thick sheet metal;

—Welding of various combinations of materials.

Research will be carried out in the following areas:

—Developing basic processes for welding with modern CO_2 lasers;

—Basic research on effects that give rise to considerable problems (for example, pore formation, working gas and bridging of gaps;

—Aspects regarding knowledge of material, process diagnostics or process control, quality criteria, and quality controls or assurance;

—Developing models and providing the groundwork for understanding quantitative connections between laser-beam parameters and treatment results, as well as work on process techniques concerning the interaction of beam source and material;

—Comparisons (both quality and economic analyses) and if necessary, combination with other, more conventional treatment processes;

—Basic research on technical rules, norms, and standards.

Projects or assignments aimed at specific product applications and developments are not considered.

2.2 Machining With High Performance CO_2 Lasers

The objective of this joint project is the development of basic methods for machining given metal volumes using a pulsating CO_2 laser with a medium performance of 1-10 kW. Particular emphasis is placed on machining metals, plastics, and ceramics.

Research will be conducted in the following areas:

—Basic research on machining given volumes of material;

—Developing models and providing the groundwork for understanding quantitative connections between laser beam parameters and processing results, as well as work on process techniques concerning the interaction of beam source and material;

—Aspects regarding knowledge of material, process diagnostics or process control, quality criteria, and quality controls or assurance;

—Comparisons (both quality and economic analyses) and if necessary, combination with other, more conventional tooling metods;

—Basic research on technical rules, norms, and standards.

Projects or assignments aimed at specific proudct applications and developments are not considered.

2.3 3-D [three dimensional] Processing Using High Performance CO_2 Lasers

The theme of this joint project is the development of basic methods for laser beam cutting and welding of metallic work pieces, using CO_2 lasers with a 1-10 kW performance.

Research can be conducted in the following areas:

—Developing basic methods for cutting and welding with modern CO_2 lasers;

—Basic research on effects that give rise to considerable problems (for example, pore formation, working gas, and bridging of gaps;

—Aspects regarding knowledge of material, process diagnostics or process control, quality criteria, as well as quality controls and assurance;

—Developing models and providing the groundwork for understanding quantitative connections between laser beam parameters and treatment results, as well as basic work on processing techniques concerning the interaction of beam source and material;

—Comparisons (both quality and economic analyses) and if necessary, combination with other, more conventional processing methods;

—Basic research on technical rules, norms, and standards.

Projects or assignments aimed at specific product applications or developments are not considered.

2.4 Surface Processing With High Performance CO_2 Lasers

The theme of this joint project is the development of basic processes for surface treatment with CO_2 lasers with a 1-10 kW performance in the following areas:

—Hardening using high-performance CO_2 laser beams;

—Surface finishing with high performance CO_2 lasers;

—Marking and scribing with CO_2 lasers.

Research can be carried out in the following areas:

—Basic research on process techniques or process parameters;

—Developing models and providing the groundwork for understanding quantitative connections between laser beam parameters and processing results, as well as work on process techniques concerning the interaction of beam source and material;

—Aspects regarding knowledge of material, process diagnostics or process control, quality criteria, as well as quality controls or assurance;

—Research on surface processing methods on substrates such as iron based alloys, light metals, nonferrous heavy metals, and NI-based alloys;

—Comparisons (both quality and economic analyses) and if necessary, combination with other, more conventional processing methods;

—Basic research on technical rules, norms, and standards.

Projects or assignments aimed at specific product applications or developments are not considered.

2.5 Material Processing by Means of Excimer Lasers

The theme of this project is the development of basic processing methods for metals and non-metals using excimer lasers with a performance lower than 1kW. Research can be conducted in the following areas:

—Development of physical and technical bases for the interaction of shortwave UV radiation and technically relevant materials (development of models);

—Development of basic methods for shaping (drilling, cutting, structuring);

—Basic research on activation processes (doping, casting);

—Aspects regarding knowledge of materials, process diagnostics or control, quality criteria, as well as quality controls or assurance;

—Comparisons (both quality and economic analyses) and if necessary, combination with other, more conventional processing methods;

—Basic research on technical rules, norms, and standards.

Research on systems and related components will be considered only if it concerns modification of existing components that are required for UV-related problems and that are indispensable prerequisites for process analysis. Projects and assignments that are aimed at specific product applications and developments are not considered.

3. An essential goal of the joint project is to publish a handbook containing research results in a form suitable for use in an industrial setting; the data will be prepared so as to be compatible with the possibility of electronic publishing.

4. Laser manufacturers, system integrators, laser users, as well as research institutes are invited to participate actively and/or informally.

Particular consideration will be given to proposals supported by concrete ideas for cooperation between companies and institutes (for example, FhG [Fraunhofer Society], MPG [Max Planck Society], universities).

Before grants are made, the participants must nominate a project committee in conjunction with the project management, VDI Technology Center.

5. The BMFT subsidizes joint projects according to the proportion of funds available in the budget. For subsidy programs concerning industrial firms, at least 50 percent must be provided by the company. For institute expenditures, industry participation of 25 percent is usually required. This participation can also take the form of equivalent payments, such as provision of additional operational funding or materials.

Current management principles of the minister of research and technology will be taken as a basis. There are no legal claims to subsidies.

6. Proposals for operating these research projects, which for the time being should consist of a short project summary noting in particular the topic of projects, goals, work and time schedules, required funding, and project participants, should be sent to the project management, VDI Technology Center before 15 January 1988.

7. Further information on these joint projects, particularly information regarding subsidies can be obtained from the project management, VDI Technology Center.

[Signed] Dr Roehrig, Federal Ministry for Research and Technology

08701

MICROELECTRONICS

Philips, Siemens in 64 Megabit 'Megaproject' Follow-On

36980182 Rotterdam NRC HANDELSBLAD in Dutch 8 Feb 88 pp 1, 16

[Article by Eefke Smit and Dick Wittenberg: "Extensive Support from Governments Requested: Philips and Siemens in New Chip Project"]

[Text] Philips and Siemens expect this year to reach agreements with the German and Dutch Governments concerning extensive government support for a new chip project involving an investment of DM 3.5 billion. The Dutch Government is considering—provided that a proportionate part of the research takes place here—contributing between 250 and 300 million guilders.

The main part of the project will be carried out by Philips, Siemens and if possible two scientific institutes. In the FRG, the institute is the Fraunhofer Gesellschaft, and in the Netherlands informal contact has been sought with the Delft Institute for Microelectronics and Submicron Technology (DIMES). In three smaller parts of the new chip project, participation will also be open to companies and institutes in other parts of Europe, within the framework of the Eureka technology program.

According to C. Krijgsman, the director of Elcoma (Philips' chip division), the new concentration of forces will have an entirely different character than the current cooperative agreement with Siemens, the so-called megaproject. That project was begun at the end of 1984 to develop a new generation of chips, the goal being to do away with the technological lead held by Japanese manufacturers within 5 years. For this, the two companies received a half billion guilders in subsidies.

The new project by Philips and Siemens will focus on developing the technology that is needed to make chips two generations further, says a spokesman from the West German Ministry for Research and Technology. Such a 64 megabit chip can hold more than 64 million units of information, or the text on 3,200 pages of A4 paper.

In the new Siemens and Philips chip project, attention was given to the possibility of allowing more European companies to participate within the framework of the Eureka European technology program. However, Siemens in particular continues to be less willing to share know-how with other European partners such as the Italian-French SGS-Thomson and the British Plessey. Thus, negotiations with the two governments were begun concerning the bilateral project.

A spokesman from the Ministry of Economic Affairs confirmed that talks are under way with Philips concerning a follow-up to the megaproject. He declined to provide further information. A spokesman for the West German Ministry for Research and Technology says that decisions on extensive government support will be made over the course of this year.

Concerning the exclusion of other European participants from the new megaproject, Mr J. Knorr, the member of the Siemens board of directors responsible for chips, says that it is logical that companies like SGS-Thomson and Plessey cannot be allowed to work on the main project.

According to Knorr, "it is almost unthinkable" to involve companies that did not participate in the first megaproject as full participants in a follow-on project.

"However, there are certainly parts of the project that appear to make the participation of others desirable," says Knorr. "Perhaps part of the project could be done by two countries together and the other part could be done by two other countries." Philips says that the talks "are still at too sensitive a stage to be able to talk about main and secondary roles."

At the Italian-French conglomerate SGS-Thomson, it is pointed out that even before their recent merger, SGS and Thomson were working on the development of a special sort of programmable megachip. The company declined to comment on its pointed exclusion from the new megaproject.

According to a spokesman for the German Ministry [for Research and Technology], it is intended that more European companies and institutes be involved in three other elements of the project, under the auspices of Eureka. These areas involve the further development of process technology, the development of design instruments for users and basic research.

Research and development within the framework of the megaproject that began in 1984 has cost a total of around 1.5 billion guilders. The German and Dutch governments have covered around 500 million of this total. That government share will have to be considerably higher in the follow-on project, thinks J. Knorr, "or otherwise the industrial partners will not be willing or able to undertake such a high-risk and costly project."

Knorr warns that the follow-on project "will require considerably more money than the megaproject," although he is unwilling to name a figure "because the project is still in the definition phase."

According to Knorr, Philips and Siemens have "taken the first step towards playing in the world division of chip manufacturers" through the megaproject. The next step must be to convert the technology obtained into products for which there is a mass market in Europe, the Siemens executive says.

In his opinion, only in this way can the European chip manufacturers gain the process experience necessary to produce competitively. He believes that these products should be defined in conjunction with the users, the European electronics companies.

Krijgsman from Philips agrees that the two companies are technologically back in the running, thanks to the megaproject. In his opinion, the issue now is "to connect the users to the technology."

The structure of the project displays many similarities with the industrial research programs that have been run in Japan for some time now. There are also resemblances to Sematech, the American initiative of chip producers and users to set up an institute where new manufacturing technologies are to be developed.

"We do not have to be more clever than our competitors," Knorr says. "We only have to look at how they're doing things. That works too."

12271

Nondestructive Chip Testing Method at Philips of Netherlands

36980151 Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 11 Jan 88 p 8

[Article by re: "Testing Chips With Microphotoluminescence: Philips: A Non-Contact, Low Temperature Testing Method"]

[Text] Progress in communications technology using optical fibers and the development of high-speed switching circuits have led in the past few years to increasingly expanding applications for III-V semi-conductor connections such as gallium-arsenide and indium-phosphide and their mixed crystals. Nonetheless, applications are currently still limited by insufficiently controlled surface characteristics, according to Philips, Einhoven. This results in problems of instability and related variations in behavior, which impair the quality of the component. On the other hand, surface parameters—oxidation, unevenness—determining the electrical properties of the component are insufficiently familiar. Hence it is important to possess the techniques for studying surface quality during the course of various processing steps.

As Philips reports, this kind of technique has been developed by Laboratoires d'Electronique et de Physique appliquee [Electronics and Applied Physics Laboratories] (LEP), which are part of the international Philips Research organization. Photoluminescence with high local resolution offers a non-destructive inspection procedure. It is supposed to react to minute changes in technical parameters. Lateral resolution lies in the magnitude of structures created in microelectronic circuits.

The method is based a procedure whereby a small area of the semi- conductor specimen is excited with a laser and the luminescent radiation emitted from the specimen is measured. The laser beam is directed across the specimen in the form of a raster to produce a "map" of the photoluminescence. Philips believes that this provides a good indicator of surface quality: weakly luminescent areas correspond to areas of high defect density (dislocations and the like). Depending on the system used to capture the luminescent light, the researcher creates a map with either average or high resolution. Using a photocell as a detector, standard chips 50 millimeters in diameter can be analyzed using a 400 micron raster.

Philips thinks that if this test is repeated with each step in the manufacturing process, the influences of the various processing steps on surface quality can be traced. This study of the overall performance of the specimen could be extended by using more detailed analysis of the direct environment of the components being fabricated. A video camera with high-resolution optics will be used for this purpose so that an area of 200 x 200 microns can be observed with a resolution of one micron. Because the signal is very weak in this case, measurement is taken at low temperatures (4 Kelvin).

13127

France Develops Superfast Image Processing System

36980140a Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German6 Jan 88 p 8

[Text] With the system Morphopericolor, the French company Numelec in Le-Mesnil-St-Denis is introducing a computer-supported morphometric image processing system that is supposed to be able to operate at an

extremely fast processing speed. Numelec is represented in the FRG by the company Datalog (Bahnhofstr. 26, 4050 Moenchengladbach 2). Sensing, processing, and analyzing of an image takes less than 1 second, reports the French Information Center for Industry and Technology (Fizit) in Frankfurt. In this connection, it says, automatic object separation and grain-size measuring takes 950 milliseconds, and to inspect a screw thread for absence of defects takes 200 milliseconds.

Morphometry, whose mathematical foundations were laid down 20 years ago at the French Ecole des Mines in Paris, pertains to a series of non-linear transformations for converting into gray values or binary values, which allow a computer-supported further processing of the picture information. These transformations are said to be a part of the permanent program within the image processor of the Morphopericolor. Moreover, the system also is said to have a flexible 16-bit parallel architecture, which is to permit simultaneous measuring and analysis.

In its standard form, Morphopericolor is equipped with four inputs for video cameras or CCD cameras and with a plug-in card for video data logging in real time with simplex and double resolution (256 times 256 and 512 times 512 picture elements respectively). Available for graphic representation are 256 gray values and 256 color tones. It is said, in addition, that Morphopericolor proves to be particularly efficient in the processing of complex picture contents, for example, in connection with optical sensors for the new generation of industrial robots or with three-coordinate measured-value transducers. Thus, for processing there are available various functions such as reduction of the picture information, skeleton creation, convolution, histogram creation, gradient analysis, or the measuring of curve lengths and areas.

The system is controlled by an IBM-PC-compatible personal computer using the operating system MS-DOS. The functional parameters of the image processor can be written in the programming languages of Forth, C, or Pascal. Together with the user program, a number of typical application examples are furnished, which extend from measurements of grain size distribution to the geometric checking of profile tolerances and positional tolerances.

12114

French Improve Surface Mounting Technology

3698a133 Paris L'USINE NOUVELLE in French 24 Dec 87 p 39

[Article by Alain Dieul: "Talco Short-Circuits the Whiskers"; first paragraph is L'USINE NOUVELLE introduction]

[Text] This small company has just registered a worldwide patent for a high-performance welding method.

While large companies grapple with the problem of welding surface-mounted compounds, a small Montauban company with 230 employees has found the answer. Talco company, well known for its work in mobile telephone and alarm systems, has just registered a worldwide patent on a method to eliminate the famous whiskers. These appear during welding and can, depending on their size and placement, cause short circuits with sometimes disastrous consequences.

The Talco process takes into account the ratio of the heat-affected surface and the volume to be melted. "Since this is greater for the whiskers than for the actual welds—former melt on average in 5 seconds, whereas the welds reopen in 15 seconds—the difference is sufficient to remove these faults without changing the electronic card," explains Francis Bourrieres, production manager. After the integrated circuits have been welded, all that is needed is to turn the card and immerse it in an oil bath brought to a temperature of 215 degrees Celsius so that the whiskers disappear, without any of the components coming loose. Depending on where they are situated and the surface tension to which they are subjected, they are swept away in the oil bath or spread out along the metal track of the printed circuit. It is even possible to create false tracks beneath the package of large-dimension integrated circuits to "drain off" the defects.

Talco has developed a new welding line with SEM, a mechanical equipment company, which is also in the Montauban area. The equipment, which will cost about Frl million, is expected to be put into production in early 1988.

[Box]

Whiskers: A Poorly Known Phenomenon

It is not clear why whiskers form in welds. Generally, specialists think that the flux contained in the weld—flux used to improve the quality of the weld—reaches the boiling point during the welding of the components. In trying to pull away, the flux drags with it the metallic material in splinter form, thereby forming the aforementioned whiskers.

25041

New Design Center in France For European Silicon Structures

36980147b Paris ELECTRONIQUE ACTUALITES in French 18 Dec 87 p 11

[Unsigned article: "SOREP Becomes ES2 Design Center"]

[Text] An agreement has been reached between SOREP (Rennes Company for Professional Electronics), located at Chateaubourg, and ES2 (European Silicon Structures). As part of this agreement, SOREP becomes a design

center for ES2; for this, the Rennes company, which is already equipped with an Apollo work station, will receive ES2's Solo 1000 and 1200 software programs.

Thanks to this agreement, we were told by Mr Demanges, marketing director for southern Europe, ES2 expects to penetrate the military market which SOREP currently drains with its hybrids.

As Mr Dadou, SOREP's president, indicated in February, the company started the fabrication of gate arrays of rather low complexity, to be integrated into its hybrids. ES2's support should help it in its task, since the military orders its circuits in small or medium volume (which ES2 handles perfectly).

What is more, this alliance should strengthen the presence of the two companies in the PMI/PME (small and intermediate industries and enterprises) sector.

A closer collaboration is not out of the question, since both companies use Sentry 15 instruments for testing, and both have assembly units.

ES2 is qualified by the military for its technology. A CELAR (Weapons Electronics Center) report has just been "declassified" and can thus be supplied by the company to equipment manufacturers. The report stipulates that the "e-beam" technology used by ES2 does not introduce any modifications with respect to photolithography technology. Excel's US unit was thus qualified. The Rousset unit should be subject to the same approval when it starts volume production.

11023

Siemens of FRG Opens New Chip Factory in Austria

3698025 1a Vienna DIE PRESSE in German 19 Jan 88 p 17

[Article by ju: "Only Intelligent Chips Make a Profit; SIEMENS Restructures Villach Plant"]

[Text] Villach. Siemens is girding its Villach chip plant for the future: Yesterday was the official opening of the largest development center for microelectronics in Central Europe. This think tank is designed to ensure the success of the current campaign to restructure production of less profitable mass-produced memory chips in favor of highly intelligent electronic applications. As their showpiece, Siemens developers intend to introduce a new chip that will revolutionize heart pacemaker technology.

The worldwide mass market for memory chips is currently under extreme pressure. "Chip production is just a playground where we are practicing our skills with very fine structures," a Siemens spokesman explained yesterday in an interview with the "Presse." "Nobody is making any money in this area right now. Consequently Siemens started some time ago to restructure production in the Villach component plant. It employs 1750 workers, books sales of 1.7 billion Austrian shillings per year, and is owned 75 percent by Siemens AG of the FRG and 25 percent by Siemens Austria. The component plant does remain the second-largest manufacturer of memory chips in the world, but only 40 percent of Villach's production volume is dedicated to the inexpensive chips. The rest is already dedicated to "intelligent" electronic components.

As a basis for this restructuring process, Siemens Villach has constructed a new development center for microelectronics at a cost of 95 million shillings; the center was opened yesterday by Siemens Austria's General Director Walter Wolfsberger and Science Minister Hans Tuppy. The Development Center provides space for 100 highly qualified engineers together with the necessary infrastructure. An additional 150 million shillings had to be invested for the electronic equipment used in the development center.

At the present time 88 employees are employed in the Villach development center, of whom 53 percent are academics, 42 percent are graduate engineers and 5 percent are secondary school graduates. As emphasized yesterday, the profession of "chip designer" is beginning to take shape and will eventually exceed that of software developer in importance.

13127

FRG-Backed R&D Center 'Jessi' Begins Planning Stage

36980140b Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 28 Dec 87 p 8

[Text] Itzehoe—In a planning stage, the microelectronics center Jessi [Joint European Submicron Silicone [sic] Institute] being planned by electronics companies and supported by the Federal Government is to begin initial work in January 1988 at Itzehoe (Steinburg district). As Dietrich Austermann (member of the Bundestag) reported, the task of the planning will be to determine the ultimate site for this research project in Schleswig-Holstein and to give a description of the project in such a way that drawing up the construction plan can be begun in 1989.

The project, which is geared to long-range work, provides among other things for the development of a course of research on perfecting process and manufacturing techniques for very-large-scale-integration circuits. Partners are the companies Siemens, Philips, the Fraunhofer Society, and a Dutch research institution. Altogether, capital expenditures in the billion-mark range and about 1,000 jobs are being talked about. According to Austermann's account, Jessi is designed to counter the Japanese dominance on the world market.

For the planning stage, which involves 25 researchers, the computer center of the savings-bank accounting association at Itzehoe-Edendorf was rented for 1 year; this center had become available through its linking up to the data processing system of Schleswig-Holstein and had been acquired as a new domicile by the Itzehoe Land Office Administration. As Austermann further reported, for this planning period DM 30.5 million have been made available in the 1988 Federal budget. According to him, the infrastructure requirements and the intended scope and nature of participation of the Land will play an important role in the decision about the ultimate site. He said that following completion of the definition stage in the autumn of 1988, the site determination together with the preparation of the Federal budget estimate for 1989 can be expected.

12114

New Belgian, FRG Microlithography Processes

36980147a Paris INDUSTRIES ET TECHNIQUES in French 10 Dec 87 p 46

[Article by Philippe le Coeur: "Optics Versus X-Ray Competition"]

[Text] Today, the dimension of the fundamental line on the most advanced integrated circuits is 1 μm. In no more than 10 years, it will be 0.5 μm and less. This evolution forces fabrication equipment manufacturers to constantly develop new machines, and this is particularly true in lithography. Three techniques are currently available: optics, X-rays, and electron beams. No one can yet say which will predominate in the future.

Alignment Precision of 0.15 m

But "optical step-and-repeat cameras retain all their potential," states Gerard van der Sluijs, of ASM Lithography. These machines can reproduce lines up to 1 μm in thickness. Thanks to the development of new projection lenses that operate at a wavelength of 365 nm, the lines should reach 0.6 μm. That is what ASM offers with the PAS 2500/40, a step-and-repeat camera capable of exposing forty 150 mm diameter wafers per hour, with an alignment precision of 0.15 μm. However, the manufacturers of optical step-and-repeat cameras do not intend to leave it at that. "A critical dimension of 0.3 μm is within the capability of this equipment," says Mr van der Sluijs, "through the use of an excimer laser (248 nm) and quartz lenses." At the end of 1988, ASM Lithography will market such a machine. It will have to face a serious competitor, the X-ray step-and-repeat camera. The latter appears as "the" number one challenger, since the company NEC has recently demonstrated that it is possible to achieve 0.2 μm structures thanks to this process! Several firms have entered this market. In Munich, only Karl Suess was present with its XRS 200. Developed in cooperation with the Berlin Institute for Microstructure Technology, the XRS 200 is aimed at pilot lines and R&D groups: it can reproduce lines thinner than 0.5 μm on 200 mm wafers. The first deliveries, with a plasma source, are scheduled for early next year. The compact synchrotron source is expected in 1989. Too slow and too expensive, electron beam lithography no longer appears to be a serious competitor.

At least not for mass produced integrated circuits; it should however take advantage of the growth in custom designed integrated circuits.

11023

SCIENCE & TECHNOLOGY POLICY

France, FRG Sign Accords With China

Alcatel Turnkey Equipment for Peking

55002436b Paris ELECTRONIQUE ACTUALITES in French 22 Jan 88 p 7

[Text] Alcatel NV has just signed in Beijing a comprehensive contract worth Fr580 million with the Peking telecommunications administration (BTA) concerning, notably, expansion of the telephone network in the Chinese capital.

The first part of the contract totalling Fr488 million, for which Alcatel CIT is the prime contractor, involves the turnkey installation of 10 additional "Alcatel E10" exchanges and 12 digital satellite centers representing a capacity of 155,000 heavy-traffic digital lines and 50,000 additional traffic circuits.

This equipment will be supplemented by digital transmitting equipment making it possible to develop the traditional telephone network into an integrated services digital network.

In Beijing, 26 of the 29 digital exchanges operated by the [telecommunications] administration are French (Alcatel) systems, including 24 "E10" exchanges.

At the same time, on 29 December, the subsidiary Cables de Lyon signed in Beijing an Fr92 million contract to supply telecommunications cables for the capital's network.

Finally, Alcatel CIT's subsidiary specializing in directional radio links, ATFH, has just been hired by the Chinese Postal and Telecommunications Ministry to put in two long-distance radio links.

These links of over 2,000 km in length in central and southwestern China will make it possible to transmit telephone communications and television images. The amount of the contract is unknown.

Siemens To Provide Equipment, Know-How

55002436b Paris AFP SCIENCES in French 3 Dec 87 p 5-6

[Text] Munich—Siemens and the People's Republic of China have worked out the main lines of a cooperation agreement for public switching, micro-electronics and the training of Chinese personnel in the new technologies, the West German firm reported on 1 December.

This agreement in principle, part of the cooperation agreement signed between China and Siemens in 1985, was concluded during the Beijing visit of the president of the Board of Directors, Karlheinz Kaske. Under it, a joint venture will be set up to assemble digital telephone exchanges. The firm's management in Munich was unable to specify the future plant's capacity. The West German firm is also planning to transfer technology in the field of microelectronics.

Finally, the agreement includes construction in Beijing of a technology center, the Beijing Technological Exchange Center, which will allow continuous training of 500 Chinese technicians every year in the fields in which Siemens operates. The first stone will be laid in the spring of 1988.

Siemens currently has four offices in China with 150 employees. Last year the West German firm achieved DM 300 million in sales. Kraftwerk Union (KWU), a division of Siemens that builds power stations, expects to conclude a cooperation agreement with China in the coming months to build a nuclear power facility at Qin Shan, 120 km south of Shanghai.

09805/09599

EC Funds 45 'RACE' Projects for 1987-91

36980186b Paris ELECTRONIQUE ACTUALITES in French 5 Feb 88 p 7

[Article: "The First 45 RACE [Research and Development in Advanced Communications Technologies for Europe] Projects"]

[Text] The EEC has just budgeted 550 million ECUs [European Currency Units] (i.e., Fr3.8 billion) for the RACE community research program on telecommunications for 1987-91. This amount represents only the public funds allocated to the program by the European Community. However, since each RACE program is financed 50-50 by the EEC and the participants in each project, the overall program budget will therefore total about 1.1 billion ECUs until 1991.

The first 45 projects will be launched soon; they will receive EEC aid amounting to 181 million ECUs. These projects were selected from among 97 proposals. For the first time, the participants will include companies or research organizations from countries that are not EEC members. These 45 projects will cost a total of about Fr2.5 billion.

As is known, the 1987-1991 RACE program follows the so-called program definition stage of 1985 and 1986, which had brought together about 100 participants, and for which the EEC had allocated 22 million ECUs.

The RACE projects deal essentially with integrated wideband communications; participants include manufacturers, PTT administrations, broadcasting companies and researchers. Research deals in particular with high-definition television, videoconferencing, CAD, radiocommunications and electronic mail. The main goal is to develop similar digital communication networks throughout the EEC.

RACE consists of three groups of projects: "Systems" (including in particular the development of tools and standards), "Technology" (terminals, software, etc.) and "Integration."

9294

EC Success in Financing High Tech Explained

3698a153 Brussels EC PRESS RELEASE in English No IP(87) 571, 16 Dec 87 pp 1-2

[Text] Mr Abel Matutes, the Member with special responsibility for financial engineering, has presented to the Commission a report on the first year of operations that reviews the three fields selected in December 1986 as priorities for financial engineering: large-scale infrastructures, high-technology projects, and small- and medium-sized enterprises (SMEs).

The communication and proposal for a Council decision concerning the financing of large-scale infrastructure projects of European interest, which the Commission sent to the Council in December 1986, have been endorsed by the Parliament and by the Economic and Social Committee. For its part, the Economic Policy Committee has stressed the benefits that will flow from such projects and has acknowledged the important role that the Commission can play in attracting private financing.

The Commission proposals are aimed at creating the right environment for the emergence and launching of major projects, and at mobilizing markets on the basis of a new approach whereby private capital would supplement and be deployed alongside public financing, and this at a time when budget cutbacks are hampering implementation of such projects as depend solely on public funds.

The Commission has devised new types of finance for high-technology projects that would be based on the setting up of investment companies (Eurotech Capital)

with exclusively private capital and on the establishment of a guarantee scheme (Eurotech Insur) that would be funded both publicly and privately and would back up the Eurotech Capital companies or other companies engaging in the same venture-capital activities in the field of large-scale high-technology projects.

Here the initiative has to come from the market, which is divided on the matter. In order to give an initial stimulus to these new types of finance, memoranda on two sets of problems are being drawn up within the Commission: (I) the tax environment and administrative rules governing international cooperation in respect of high-technology projects, and (II) the financial environment (such as arrangements for private insurance as an alternative to Eurotech Insur).

As regards the financing of SME, the Commission departments have taken further their study of certain specific aspects of the question such as start-up capital, unlisted securities markets and the financing of cooperatives. NCI IV—a loan facility specifically for small businesses—was approved by the Council in March 1987, since when there has been a steady demand for loans. The European financial engineering company at the service of small business (SEFI-EFEC) was set up in April 1987.

A new priority was added to the list in 1987: cohesion. The departments responsible for financing engineering were closely associated in preparing the comprehensive proposal for the reform of the structural funds, and the Commission proposal explicitly provides for recourse to financial engineering techniques. Work on integrating the European Investment Bank and the other Community financial instruments into the new approach for strengthening economic and social cohesion has been completed in close cooperation with the EIB [European Investment Bank].

This has led to the definition of a new method the central idea of which is to offer promoters a combination of Community grants and loans so that, where projects generate substantial income, the share of financing from the proceeds of borrowing will be maximised.

The programme in support of the development of Portuguese Industry (PEDIP), recently adopted by the Commission, is the first application of the new approach advocated by the Commission in its comprehensive proposal on the reform of the structural funds. It is also an exemplary illustration of financial engineering, since not only is it the first time that the loan/grant mix has been employed but it also represents the first attempt at systematic use of the techniques of financial engineering.

Lastly, the Commission has confirmed that financial engineering is potentially useful in all areas of Community activity, and the competent departments have already acted as financial advisers in matters of transport, research, telecommunications, fisheries, cooperation with ASEAN and southern Mediterranean countries, and energy, but especially in connection with the Integrated Mediterranean Programmes (IPMs) and integrated development operations (IDOS), as part of studies on the future of the countryside and as a financing facility for the export of agricultural products.

Taking note of the report, the Commission reaffirmed the value of financial engineering activities, especially in connection with the reform of the structural funds and the development of new technologies.

With this in mind, it has urged Mr Matutes to maintain his contacts with interested parties.

The Commission will also seek to ensure that its various departments take account of the contribution which financial engineering can make to their work.

Financing of Spain's Computer, Robotics Technology Sector Reviewed

Government Funding

36980142 Paris ZERO UN INFORMATIQUE in French 7 Dec 87 pp 25-26

[Article by Florence Gicquel: "1992's Double Stakes"]

[Excerpts] Five centuries after Spain's conquest of America, it will be Spain's turn to be rediscovered: "Seville'92" and the 1992 Olympic Games represent major stakes for all Spanish enterprises. The data processing and telecommunications industries are the most directly concerned.

The Spanish data processing market has grown steadily over the past 2 years. The data processing services market is growing at a rapid rate (35 percent per annum) and is very concentrated geographically: 23 percent in Barcelona; 19 percent in Madrid. In 1986, the sector had over 250 data processing services firms, only 5 percent of which had international standing.

The extent of foreign capital participation in the sector is substantial. French service firms are doing very well in this regard: GSI and CISI own, respectively, 60 percent of SERESCO and 41 percent of Centro de Calculo Sabadell [Sabadell Computer Center], while Cap Sogeti, SG2, CEGOS, and SEMA Metra participate in the ownership of various companies.

This foreign-capital participation pattern prevails among the builders as well. Since Fujitsu's acquisition of SECOINSA by Fujitsu around yearned 1986, the former leading Spanish data processing firm now trails far behind the big ones (IBM, Nixdorf, Olivetti, and NCR) in relative standing. This foreign penetration of the Spanish data processing sector has its roots in Spain's

technological dependency: 85 percent of its patents are the result of research work done abroad, and 55 percent of Spanish production is done under foreign license.

National Data Processing Effort Lagging Far Behind Advance of Foreign-Participation-Based Enterprises

The intent of the PEIN [National Electronic and Data Processing Plan] instituted by the Government for the years 1984-1987 was to stimulate production on a domestic scale. In addition to specific approaches (see 01 INFORMATIQUE No. 935, of 15 December 1986), the plan called for a number of lumpsum and targeted subsidies to enterprises.

In its application, sizable funding by the PEIN went to foreign firms. Perhaps joint ventures between Spanish and foreign firms should have been developed to further and render more effective the goals of the PEIN. Today, at the conclusion of that first plan, it is difficult to assess its results. However, the effort undertaken by the Government is continuing in the form of the two aforementioned projects: The 1992 Olympic Games and World Exposition'92.

Exposition'92 will be held in Seville from 20 April to 12 August of that year, and the Olympic Games at Barcelona from 27 July to 9 August. The mayors of these two cities have met to arrange for the two events to complement each other. The Exposition is expected to bring some 17 million persons to Seville; and Barcelona is expecting no less than 500,000 tourists. Hence, the importance of the stakes.

An investment on the order of Fr28 billion, for the Exposition itself and public works for communications, is planned for Seville. Barcelona is planning on a budget of Fr15 billion for its required infrastructure.

The main outlines of the Seville World Exposition Data Processing and Telecommunications Plan were defined at the start of 1987 by Abengoa (an Andalusian firm specializing in the installation of electric power lines) and Telefonica Sistemas, a CTNE subsidiary. The plan was based on assumed participation in the Exposition by 80 countries and 12 international organizations, and an estimated total of around 17 million visitors. Its budget totals 4.42 billion pesetas, or Fr200 million.

The principal works involved are the installation of a broadband communications network, the creation of a data base containing all the information on the Exposition and connected to external Spanish and Latin American data bases, and the computerization of specific services at each exhibit.

The initial project consists of the installation of 2,600 digital connection points controlled by two front-end computers; 425 telematics terminals; 350 video communications monitors; 200 high-resolution monitors; 30 ISDN terminal exchanges; and an optical-fiber cable network. This program will accord priority to Spanish national companies, but foreign companies submitting innovative or original solutions will not be excluded, particularly if they team up with local partners.

Private Sector Figures

36980142 Paris ZERO UN INFORMATIQUE in French 7 Dec 87 p 25

[Article by Angels Farreny]

[Text] According to a recent CHIP magazine study of the Spanish data processing sector's 50 leading enterprises in 1986, the sector had revenues totaling 483,559 million pesetas, of which IBM's share was 180,000 million pesetas. Indescomp, the leading Spanish private-sector firm, behind seven multinationals, was recently absorbed and reports a revenue of 15,000 million pesetas.

Of the 50 top firms, 16 are Spanish. Be that as it may, in 1986, I&D invested 895 million pesetas, of which 408.2 million pesetas were by ENTEL, a subsidiary of CTNE. The rest was divided among Logic Control (100 million pesetas), Centrisa (193.8 million pesetas), and APD Group (115 million pesetas), etc. The 16 Spanish firms reported revenues totaling 41,442.4 million pesetas, broken down as follows: Indescomp, the Amstrad distributor, 15,000 million pesetas; Microelectronica y Control, the commodore distributor in Spain which has recently been absorbed by Commodore, 1,900 million pesetas; Entel, 5,130 million pesetas; Logic Control, 3,200 million pesetas; and DSE, 2,900 million pesetas.

As for services, there are 12 firms whose principal activity lies in this sector; all together, their revenue totals 26,300 million pesetas. Seven of these 12 are wholly owned by Spanish capital; ownership of the other five is shared by foreign capital, primarily French, as in the case of the CISI Group, GSI-Seresco, GSI-Sofemasa, Sema-Metra, and CTI Control Data. Five of these 12 companies have reported their 1986 exports (IG Iberica, 166 million pesetas; Logic Control, 60 million pesetas; Seresco-CISI, 38 million pesetas; Sofemasa-Sema-Metra, 80 million pesetas, and Sabadell-CISI Computer Center, 10 million pesetas). Worthy of mention is the sizable growth that has characterized all these companies in recent years. Seven service firms—Gisa, TG Iberica, Eria, Logic Control, Entel, Centrisa and Isis—figure among the 25 firms that grew the most in 1986.

9399/9738

Status of Robotics Sector

360980141 Paris ZERO UN INFORMATIQUE in French 7 Dec 87 pp 26-27

[First paragraph is ZERO UN INFORMATIQUE introduction]

[Text] Spanish robotics research and installation lagged behind the rest of Europe in the early 80's. However, current rapid development is attracting numerous investors.

Thanks to the Common Market, or perhaps because of it, Spain is starting to catch up technologically. This takeoff is directly related to an opening up [of the economy] and to competition. The more open economy is important because Spain's relative lack of plant has brought about greater demand for imported goods and equipment; competition because domestic research and development programs instituted in 1983 are starting to bear fruit.

The fact is that scientific and technological development only began to receive priority attention in 1983. Until then, research and development efforts were the weakest in Europe, with allocations of 5.5 billion French francs, or 0.5 percent of the GDP.

Aware both of Spain's lag and of the scientific and technological stakes that were beginning to bring drastic changes in many Western nations, the Spanish government adopted a series of measures aimed at better coordinating domestic research efforts and laying the foundations for rapid development in this economic sector.

Thus, in 1983 new legislation (the university reform law, the statutory order on reconversion and reindustrialization, the research promotion and coordination law) were enacted. This same period saw the drawing up and adoption of domestic research and development plans and programs targeting sectors considered strategic.

Old organizations, such as the Center for Technological and Industrial Development (CDTI) were reorganized and given major funding, and financial and fiscal incentives to business were created. These reforms were outlined in the 1984 National Computer and Electronics Plan.

In 1985 the Advanced Industrial Automation Plan was implemented following guidelines laid down in the National Computer and Electronics Plan. Its goals were to develop basic automation and artificial intelligence technologies, create robotized manufacturing systems, and develop related applications. A total of 5,200 billion pesetas, including 1,700 billion earmarked for business, was allocated for a 3-year period.

In the applications area, several Spanish companies have already benefited from the Advanced Industrial Automation Plan: Balay (376 million pesetas), JYP (178 billion pesetas), Saci (112 billion pesetas), and Copreci (956 billion pesetas). The following have received funding for manufacturing projects: Aurki (300 billion pesetas) and SEI (116 billion pesetas) for the manufacture of the Scara-type Danobat robot, SCAP Espanola (30 billion pesetas) for a control system, Total Computer (171 billion pesetas) for digital control equipment, Eliop (400 billion pesetas) for building a programmable automaton factory, and Asea (300 billion pesetas) for developing the production capacity of its Sabadell plant.

As an extension of these measures, 10,300 billion pesetas (515 billion French francs) will be set aside for long-term Industrial Credit Bank loans to companies for the acquisition of electronic equipment.

Total Coordination of Subsidies of up to 70 Percent of Total Investment

In addition to research, the Advanced Industrial Automation Plan also coordinates funding for the various participating administrative bodies: Caicyt (Advisory Committee on Scientific and Technological Research), CDTI, and DGEI (the Ministry of Industry's General Directorate for Electronics and Computers).

Of these bodies, CDTI obviously is the one with the dominant role in the development of robotics in Spain today. Its main function is to promote industry-submitted industrial innovation projects that fall within Ministry of Industry priority sectors.

With a budget of over 24 billion pesetas, CDTI provides funding to innovative companies for up to 50 percent of the investment amount. Over 40 projects have been funded by CDTI, for a total of around 2.5 billion pesetas. Ten percent of the investment involves robotics per se.

At the same time, CDTI is also attempting to sensitize foreign robotics firms to Spanish developments in the field in order to attract international investment. More important, CDTI's dominant role in technological development strategy was recently confirmed when the Spanish government gave it the task of coordinating participation in the Eureka program.

Two companies, Casa and Inisel, are involved in the Eureka robotics program. Casa has a 17-percent participation in the mobile robot development project, and Inisel, a subsidiary of the INI group, is contributing 20 percent of the funding needed to develop a flexible manufacturing system.

Working in conjunction with CDTI, the General Directorate for Electronics and Computers at the Ministry of Industry provides additional subsidies to the best CDTI- or Caicyt-financed projects, as long as total government funding does not exceed 70 percent of investment.

In addition to this assistance from the [central] government, Spanish companies also receive support from the 17 autonomous governments that make up the country. For example, the Catalan government subsidizes research organizations like Barcelona's Cybernetics Institute and provides funding for Catalan companies wishing to modernize their production plant. This assistance can amount to as much as 4 billion pesetas (200,000 French francs) per company. Some 20 Catalan firms have already received funds for robot acquisition.

Lastly, several recently created associations are also contributing to the promotion of robotics in Spain. Founded in 1985, the Spanish Robotics Association (AER) has the priority goal of defending the interests of the profession and promoting robotics-related technologies. Its members currently number over 140.

Adamicro was created by the Ministry of Industry to promote industrial robotics applications. Robotics centers linked to Redinser (Electronic Services Integrated Network) assume Adamicro's role at the regional level. These organizations and initiatives have gradually changed the face of the robotics sector in Spain.

"In light of the number of companies that are still under-equipped and the recently adopted incentive measures, the next few years should see a growth in the number of robots at least as great as the 25 percent and 29 percent recorded in 1984 and 1985 respectively," French experts in Madrid believe.

Rapidly Changing Market With Annual Growth Rate of Almost 30 Percent

This growth has brought a redistribution of markets and relative strengths and weaknesses. The automobile industry's share of robot purchases should continue to fall. It came to 62 percent in 1984 and 43 percent in 1985. Current purchases in this sector are oriented towards painting robots, an area in which Spain is largely underequipped.

The sector which is likely to show the greatest demand in the next few years is metals processing. Already in 1985, this industry's robot plant had doubled, from 56 to 114.

This user-industry shift is accompanied by a change in the types of robots in demand on the Spanish market. Again according to French experts, "Spot welding robots, which have been the biggest sellers until now, are beginning to predominate less." Indeed, today's Spanish manufacturers show the greatest interest in handling, assembly and arc welding systems.

Currently, spot welding robots constitute the bulk of Spain's robot plant. Spot welding robots account for 50 percent, in contrast with handling (17 percent), arc welding (13.5 percent), projection (6.5 percent), assembly (6.5 percent), gluing (2.5 percent), and finishing/machining (0.3 percent) robots. However, growth rates by use type clearly point to the beginnings of a reversal in the pattern.

In 1985 assembly robot plant increased 138 percent. Handling robot plant went up 47 percent, and arc welding plant 36 percent. During the same period, the number of spot welding robots only increased 16 percent.

In 1986, there were 35 different makes on the Spanish market. However, two firms accounted for 60 percent of sales: Unimation (34.7 percent) and Asea (25.6 percent). Asea, a Swedish subsidiary, manufactures part of the the robots it markets in Spain at its Sabadell (Barcelona) plant. Unimation imports all its robots, most of which are purchased by General Motor's subsidiary in Spain. Of the 234 Unimation robots sold, 157 have been installed at GM.

Nonetheless, other foreign firms—DEA, Comau, Volkswagen, Yamaha, Yaskawa, Camel—are gradually gaining a greater share of the market. In 1986 Hitachi (9), Danobat (3), Cloos (2), and Thomson (1) sold their first robots in Spain. Of course, the presence of a make does not necessarily mean it has a commercial foothold. The 20 Volkswagen robots are all in 2 factories: Seat's Barcelona plant (19) and the Ford plant (1). Similarly, the 18 GEC robots in use are only at GM, and Acma robots are installed only at Fasa-Renault and Citroen.

Only four companies currently market robots made in Spain. Asea manufactures its sealing, multiple-use, spot welding, and parts handling robots there. Danobat is working jointly with the Ikerlan research center to develop three families of robots: robots designed for machines with turntable parts loading and unloading, cylinder coordinate robots capable of handling 50 kg parts, and portal-type robots.

SEI (Sistemas E Instrumentacion), a member of the Control y Aplicaciones group, has been marketing a Scara-type product designed for either assembly or handling since 1986. Pianelli & Traversera Espanola make two portal-type robots for parts handling. These are sophisticated robots with vision systems.

However, other companies are getting in on the game. Seveco, part of the Verdes group and a specialist in the design and manufacture of machines for the ceramics industry, is currently manufacturing a paletization robot.

The Inisel company (INI group) has developed its own technology in cooperation with the Industrial Automation Institute in Madrid. An Inisel robot is already in service at a foundry where automobile parts are manufactured. Lastly, the firm Duro Felguera has just finished building a handling robot.

Such diversity has gradually moved engineering firms to invest in research on new automation systems and to reach research agreements with foreign companies. A case in point is Centunion, which has just signed an agreement with the British firm Taylor Hitec Ltd. Centunion also plans to participate in the European Eureka and Esprit programs.

13014

SUPERCONDUCTIVITY

Rhone-Poulenc R&D in Superconductivity, GaAs, Photonics Overviewed

3698a123 Paris SCIENCES & AVENIR In French, Special Issue No 60, 1987 pp 6-9

[Article by Brigitte Gagnard: "High-Tech Materials: Rhone-Poulenc in the Race"]

[Excerpts] Tomorrow, the high-speed train of the future will run twice as fast by magnetic levitation; Paris will be a stone's throw away from Tokyo...by supersonic plane; ultra-miniaturized computers will be a million times more powerful than current equipment.... The key words of this ongoing revolution? Superconductivity, photonics, composite materials, ceramics, subjects which are of great interest to chemists and which already promise several-billion-dollar markets by the year 2000. Any technological breakthrough is based on the development of a specific material: silicon in data processing, optical fibers in telecommunications, composite materials in aviation and space, ceramics in high-temperature applications and space exploration, etc.

Rhone-Poulenc has not waited for this recent craze to become engaged in the race for materials. Number one worldwide in separated rare earths and polyimide resins for the electronics industry, the group is in a good position in the international competition for technical plastics, ceramics, and silicas. All these chemical specialties for all kinds of materials represent sales of Fr 10 billion for Rhone-Poulenc.

Its scientific and industrial capabilities allow it today to seize all of the opportunities offered by scientific change.

Superconductivity is the most recent example.

The industrial stakes are so high that projects are multiplying throughout the world. In April 1987, Rhone-Poulenc also entered the battle. After all, the famous ceramic material which becomes superconductive at -183 degrees centigrade is nothing else but an yttrium-barium-copper oxide, a material well known by the company from its experience in rare earths and ceramic powders. "We already know how to manufacture homogeneous quantities on the order of 1 kilogram in our pilot lab," announces Jean-Yves Dumousseau, the man in charge of products for the electronics industry in the ceramics department. "Our product is currently being tested by the Argonne Laboratory in the United States and by several industrial companies." Rhone-Poulenc immediately assigned a team of scientists in its Paris-area Aubervilliers research center to this area. The program includes synthesis of various powders which have superconducting properties at ever higher temperatures, as well as the study of the physicochemical properties that are indispensable to industry for easily working them into wires, solid parts, etc. The company will take part in several research programs conducted by some 10 universities and will pool its efforts with those of other companies in the fields of electrotechnical wires, magnets, and electronics. Betting on the future of superconductors in the year 2000 does not prevent Rhone-Poulenc from developing so-called advanced materials for more immediate applications. Such is the case with ceramic powders which are used to manufacture solid parts or reinforcing fibers. Harder than cast parts and lighter than aluminum, resistant to wear and corrosion by the strongest acids, ceramics stand up to high temperatures in excess of 1,000 degrees centigrade. The company has been supplying several qualities of yttric zirconia powders since the beginning of the year. These powders are used in the manufacture of cutting tools, scissors, mechanical parts, etc. And starting in the first 6 months of 1988, the company will annually produce 25 metric tons of barium titanate, the main component in the ceramic capacitors used in the electronics industry.

Users had to be consulted to make sure that the powders supplied tomorrow would meet market demands. This has been done since 1985 with solid ceramics. The ceramics and composite materials division, set up in association with Aerospatiale, follows all the technological developments in this field. It mass-produces all kinds of items from Rhone-Poulenc powders, from artificial hip joints to mechanical parts for the automobile and aircraft industries. One million German cars are now equipped with a water pump ring which came from its ultramodern Bazet (Hautes-Pyrenees) plant.

The other major company project in ceramics concerns the development of fibers designed to reinforce parts which are made of ceramics. The program is being undertaken together with SEP [European Propulsion Company]. The first application of these "superfibers" for all-ceramic composite materials could be in the Hermes rocket. The specifications are stringent: When embedded in the material, the fiber must withstand 1,400 degrees centigrade for 20 minutes—i.e., the time the space shuttle takes to enter into the atmosphere—and must do so for at least 20 trips. "The major difficulty involves developing a mineral fiber which is composed of several hundred filaments barely 15 microns in diameter and can be stretched over a length of at least 1,000 meters," explains Gerard Soula, director of materials research at the Saint-Fons research center. "We have released the technological bolts; all that remains is to industrialize the innovation." Rhone-Poulenc is the only European company which joined the battle against the Americans and the Japanese. Benefiting from some 10 patents on the subject over the last 3 years, the company is getting ready to start up a pilot plant by the end of 1987 to manufacture 20 kg of silicon carbonitride monthly.

The top-of-the-line plastics, reinforced by glass fibers, Kevlar, or carbon fibers also face a good future. The world market for these organic composite materials is growing at the rate of 15 percent annually. From $2 billion in 1985, it will reach $6 billion in 1995. The

dominant sector remains civil and military aviation. The lower weight of the planes justifies the still high cost of these miracle alloys which sell for between $40 and $300 per kg, depending on the quality. Today they account for about 20 percent of the weight of a civilian plane and for almost 40 percent of the weight of a military plane. They are found not only in mechanical parts, but also in landing gears, the moving sections of wings, engine nacelles, etc. And aircraft builders expect to build all of the structural parts—fuselage, wings, doors—of civilian aircraft from composite materials in the next decade.

Number one worldwide in polyimide resins (plastic materials which are heat-resistant up to 300 or 400 degrees centigrade), Rhone-Poulenc has been selling its Kerimid to the electronics industry which uses them in the manufacture of multilayer printed circuits. With the opening of the aircraft market, the group has been developing for 3 or 4 years new qualities which are designed to be used as matrices for future composite materials. "We have more than a dozen experimental resins; the best of them are about to be approved by the major world manufacturers," announces Patrick Lopez, head of the laboratory for applications of composite materials. "Some of our products are already used in in-service planes. For instance, the cone of the CFM-56 jet engine manufactured by Snecma and General Electric and used in Boeing 737, Airbus A-320, and MacDonnell Douglas DC-8 planes is made of Kinel, a glass-fiber-reinforced polyimide resin."

The field of electronics is not immune to changes in materials. Silicon, which made chips so powerful, is about to be surpassed by a newcomer, gallium arsenide. Although silicon has constantly progressed—the number of circuits on a chip has increased 100-fold in 20 years—it is reaching limits which are easily overcome today by gallium arsenide. This material transports the electrons 10 times faster. Unfortunately it remains much more expensive to manufacture. Of course, all the major electronics players work with this new material, for which applications are easily found whenever its performance is unequaled by other materials. This is the case in satellite telecommunications, supercomputers, radars, certain types of lasers, and optoelectronics, i.e., the LED's on control panels and other digital displays. Number one worldwide in gallium, the raw material for this arsenide, Rhone-Poulenc is affected by this challenge from the electronics industry. The group supplies gallium to the world market from its French Salindres plant. Its ambition is clear: to remain the uncontested leader. To do so, the company is currently building a second plant in Australia, where the raw material is found, in order to be ready to supply the world market once consumption explodes.

Electronics is the transportation of electrons, photonics the transportation of photons, a minute speck of light produced by a laser. Its advantage over electrons: Transport speed is much higher because it is the speed of light. But above all, the ability to process instantly and simultaneously a thousand times more information: speech, images, data.... The first application of photonics is, of course, optical fiber, particularly the intercontinental cables used in telecommunications. In this way, the 5,600-km transatlantic cable being laid between Europe and the United States will simultaneously transmit several thousand communications, while the conventional coaxial cable has a capacity of a few hundred.

Placed 6000 m below the surface on the seabed, this type of cable must offer all the guarantees of a long service life because there is no question of carrying out repairs very often. This explains why the materials used to protect these powerful but fragile fibers are so carefully selected. Among them, silica takes the lead. Rhone-Poulenc has been developing several qualities of silica for optical fibers for the last 2 years, each of them with well-defined properties. In addition to the necessity of protecting the fibers from moisture (one of the special properties of silicas), they must also be enveloped by a material which is impervious to light. "And it has been discovered that the hydrogen which is released by other products contained in the cable could interfere with the transmission of the signals," reports Jean-Pierre Jaubert, head of development in the silica department. "We have worked on this problem with the Italian Pirelli company and have jointly developed a formula for a silica that can absorb this stray hydrogen. We are the only ones to supply this silicon to the market." In this as in other cases, the difficulty lies in detecting the need before the market takes off. In 1987, Rhone-Poulenc sold several metric tons of silica which permitted the manufacture of some 10,000 km of seabed and land-based cables. Two-and-a-half million km of optical fibers was produced this year throughout the world, and demand for ancillary products—worth $1.1 billion—is growing at the rate of 20 to 25 percent annually. Between now and 1995, there are numerous intercontinental telecommunications cable projects: More than 40,000 km will be placed to link Europe with the Middle East; the United States and Japan with Hawaii; and Australia, Japan, and the United States with New Zealand. But a market explosion is expected especially in land cables that transmit high-definition television pictures. This type of picture is impossible to obtain using other techniques. Constant progress in optics makes this technique more and more economical: Optical fibers were three times more expensive than coaxial cables as recently as last year, but will decrease in price by 50 percent between now and 1990.

While we are now capable of routing photons through optical fibers and also of using them for reading data—the most common example is laser reading of compact disks—computing operations are still done by conventional electronic circuits because the material for the "optical chip" does not yet exist. To take advantage from the power of photonics in the future, we must find the ideal material to manufacture future optical transistors. This material should be transparent, easy to process into a thin film—miniaturization requires this—and, of

course, as cheap as possible to manufacture. For the time being, only mineral monocrystals can carry out this "switch" function, a kind of deflector to deflect light beams by changing the refraction index according to the electrical voltage applied. But they are expensive (a lithium niobite monocrystal costs several ten thousand francs) and, above all, very difficult to miniaturize. They cannot be manufactured in thicknesses smaller than 2 mm, whereas the goal is on the order of microns. For this reason, chemists also direct their work toward organic products, whose molecular structure is more suited, offhand, to processing into films, varnish, fibers, etc. "Several organic products with the sought-after properties have already been identified," confirms Claude Bonnebat, head of innovative projects.

In order to have the best chance of success in the race toward optical components, Rhone-Poulenc has just joined with CNET (National Center for Telecommunications Studies) in a common research program covering synthesis and processing of new materials. The development of an organic crystal that can double the frequencies of laser beams is high on the agenda. Once again, it is a matter of miniaturization. By multiplying the frequency of the light wave emitted by a laser beam, one tries to condense its beam to make it more accurate and double its capacity for reading or transmitting data. Data processing, hi-fi sound, high-definition images...the spin-offs of photonics are likely to be tremendous. The only limit? Imagination.

25053

UK Superconductivity Center at Cambridge

36980144a Paris AFP SCIENCES in French
23 Dec 87 p 25

[Unsigned article: "Cambridge: British Superconductivity Research Center"]

[Text] London—The University of Cambridge was selected by the National Council for Science and Engineering (ABRC) to house the British center devoted to research and development on the new generation superconducting ceramics. The National Center for Superconductivity Research is the first URC (University Research Center) in the ABRC plan.

The choice of this university among a short list of contenders was determined by the quality of the materials science department, known throughout the world for its thin film work, and one of whose representatives, Professor Brian Josephson, has won the Nobel Prize.

The center will have an annual budget of 900,000 pounds, while ten other laboratories selected at other universities will together receive a total sum of one million pounds per year to develop research on the same topic.

11023

TECHNOLOGY TRANSFER

UK, French Press Question Finnish Submarine Sale to USSR

Helsinki HELSINGIN SANOMAT in Finnish
22 Dec 87 pp 3, 32

[Article by Erkki Arni from London: "Newspapers Question the Use of Submarines Bought by the USSR from Finland," and by Lauri Karen from Paris: "LE MONDE Believes in Military Use"; first paragraph is HELSINGIN SANOMAT introduction]

[Text]

Rauma-Repola Sells Two Submarines to USSR

A French and a British paper suspect that the small submarines sold by Finland to the Soviets may be used for military purposes. THE INDEPENDENT claims that the two deepwater submarines, built by Rauma-Repola, can place down to the sea bottom listening devices which may endanger the Western communications networks. LE MONDE claims that they may also be used to investigate wrecks at great depths. Rauma-Repola denies these claims. According to a company representative, these submarines would require a lot of work before they could be used for military purposes.

At the end of December, HELSINGIN SANOMAT reported on Rauma-Repola's submarine sales to the Soviet Union and on their use in research.

Report From London

London (Erkki Arni)—THE INDEPENDENT reported on Tuesday that "according to information sources, the small submarines that Finland recently delivered to the Soviet Union can endanger both NATO's underwater communications and intercontinental telephone traffic."

According to the article written by the military affairs editor, Mark Urban, the two small deepwater submarines built by Rauma-Repola for the Soviet Union "have already been tried in the Atlantic with a Finnish commander."

With these submarines, Urban believes that the Soviet Union will be able to place listening devices down at the sea bottom where they may disturb the western communication networks.

The writer claims that Americans, using their own small submarines, had carried out similar listening operations in the Soviet waters until the Soviets were apprised of the matter by the Walker family who was convicted for spying some time ago.

According to the article, the small Finnish-built submarines could be used to investigate the wreck of a Soviet nuclear submarine which in 1968 sank to the depth of 5

and a half kilometers in the Atlantic. "The Soviet Academy of Sciences normally employs its vessels in genuine scientific research," the writer continues, "but there are known cases where these kinds of vessels that ultimately are under the Soviet Navy have been used for observation and reconnaisance."

"Some Soviet military ships act as mother ships for the small military submarines," Urban continues and adds that "it seems that the Soviet Union keeps up with the newest western technology by buying new vessels from Finland."

The author of the article also refers to the observations that have been made in Swedish territorial waters concerning the movements of small submarines and adds that Pakistan and Libya, among others, have acquired small submarines for terrorist and reconnoisance operations.

LE MONDE Believes in Military Use

Paris (Lauri Karen)—In its Tuesday issue even the prestigious French paper LE MONDE wondered if the two small submarines built by Rauma-Repola for the Soviet Union would be used for military purposes.

Officially, the submarines were ordered by the Soviet Academy of Sciences. LE MONDE admits that Mir-1 and Mir-2 may be used for scientific purposes with the equipment provided presumably by Finland and Britain. However, in the hands of soldiers, these submarines can install, control and lift all kinds of devices, especially listening devices to be placed down at the sea bottom. Furthermore, they may be used to investigate wrecks in depths that until now could be reached only by American and French submarines.

The article, written by Yvonne Rebeyrol, LE MONDE's science editor, recalls how in 1974 the American Glomar Explorer lifted a Russian submarine wreck from the depth of 5000 meters in full secrecy. Another Soviet submarine, which sank near Bahamas, also went down to the depth of 5000 meters.

"The assumed military use of Mir-submarines would be no surprise," the writer continues. Americans are presently designing submarines which can take men down to 6000 meters, as well as install and pick up equipment. Thus, they will be able to work in areas which cover 97 percent of the world's waters.

The article describes Rauma-Repola's submarines as exceptional technologically and incredibly so in some aspects.

Rauma-Repola Denies Claims by the British Paper

Claims by THE INDEPENDENT, concerning the potential military use of Rauma-Repola's submarines, were denied by the company on Tuesday. Seppo Seppala, Rauma-Repola's director of underwater technology, told HELSINGIN SANOMAT that "it would require a lot of work to get these submarines ready for military use."

Seppala noted that small submarines can be easily detected in the water because they must always stay in the proximity of a surface support ship and because they are very noisy. "But people can always make such claims," Seppala stated.

The Soviet Union has announced that the submarines are internationally available for research purposes. Thus, researches both in the East and West can take advantage of them.

Rauma-Repola delivered the small submarines to the Soviet contractor at the end of last year. The submarine has space for two scientists and a commander. In trial runs they have reached the depth of 6170 meters.

He reports that the submarines are now in Klaipeda harbor in Lithuania where they and their support ships are being equipped for a long oceanographic expedition to the Pacific Ocean.

Before the journey, probably in February, the submarines will be brought back to Rauma-Repola's factory in Tampere for a final check.

13439

TELECOMMUNICATIONS

UK Releases Funds for EUREKA HDTV Project

36980143b Paris AFP SCIENCES in French
30 Dec 87 p 25

[Article: "High-Definition Television: Rendezvous in 1990"]

[Text] The British Ministry of Trade and Industry has just made 2.5 million pounds available for the European HDTV project, HDT Eureka, the British Embassy in Paris announced on 22 December.

British experts, from the BBC and from LIBA (the agency which manages private television in Great-Britain) will play a major role in the first demonstration of the project, in September 1988 at the International Broadcasting Convention in Brighton. The goal of these demonstrations, the British Embassy indicated, is to have the HDT Eureka high-definition television system adopted by the United Nations International Radio Consultative Committee (CCIR), whose next meeting will take place in 1990.

The Eureka 95 project was launched in July 1986, following a CCIR meeting in Dubrovnik (Yugoslavia), 2 months earlier, when the Japanese had attempted to have their HIVision system adopted as an international

standard for HDTV; the project aims at continuing research in this field in order to strengthen the position of the European D2 Mac standard on the international scene.

The Japanese HDTV system uses 60-Hz 1,125-line interlaced scanning of the screen, offering a new image every 30 seconds. It is fully compatible with, and uses the same format as 35-mm movies. The HIVision standard aims at compatibility with one third of all countries in the world, where electric current is transmitted at a frequency of 60 Hz; they include Japan, the United States and Canada. However, this technology is handicapped by the fact that it is incompatible with 40 percent of the TV sets used in these countries.

9294

CCIR To Consider European Proposal for HDTV Standard

36980143a Paris AFP SCIENCES in French 26 Nov 87 p 35

[Article: "Official Recognition of the European HDTV Standard"]

[Text] On 20 November, in Paris, we learned from a source in the industry that the European high-definition television standard (HDTV) had just achieved a significant success: it was officiallly recognized by the International Radio Consultative Committee (CCIR). Indeed, at an interim CCIR meeting held in Geneva on 2-18 November, the representatives of telecommunication administrations from all over the world actually recognized the existence of a second HDTV standard, concurrently with the standard proposed by Japan and the United States.

In May 1986, at a meeting in Dubrovnik (Yugoslavia), these two countries had attempted to have their standard recognized by the international community—although it is incompatible with existing TV sets, in Europe as in the United States. After a long battle, the CCIR had finally granted a 2-year period of reflection, thus enabling the Europeans to progress in the definition of their project, in the context of the Eureka program.

"Even before 1988, the Europeans had obtained that the proposals made in the name of six national administrations (France, Great-Britain, FRG, the Netherlands, Italy and Belgium) be considered as a proposed world standard," Mr Jean Caillot, general manager of Thomson International, who attended the meeting, told the AFP [French News Agency].

Even though HDTV transmitters and sets to the European standard are not expected to be used before 1992, this first recognition from the CCIR is important at this time, as it supports the technology used by TV-SAT and TDF-1. Actually, the standard for the future HDTV is compatible with that used by these two satellites, the D2 Mac Paquet standard. In other words, viewers equipped to receive programs broadcast by these satellites will also be able to receive high-definition television when it becomes available.

On the other hand, the standard proposed by the Japanese and supported by the United States (in particular by CBS) is incompatible with current TV systems (Pal-Secam type) and with the D2 Mac Paquet standard. Indeed, it is based on electric current as it exists in Japan and in the United States, i.e. 60-Hz current, whereas Europe and most of the world are using 50-Hz current. Conversion from one frequency to the other is extremely complex.

In addition, the Europeans and Japanese differ on the number of lines on the screen: 1,250 lines for the European HDTV, 1,125 for the Japanese. The only point on which they agree is the screen size (16/9), which is larger than present screens and better adapted to the size of movie images.

9294

Matra-ATES of France To Build 3 Telecom 2 Satellites

36980130 Paris ELECTRONIQUE ACTUALITES in French 1 Dec 87 pp 1, 6

[Article by D. L.: "Construction of Telecom 2 Will Strengthen Matra and Alcatel Space Activity"]

[Text] The outcome of competing bids between Matra and Aerospatiale, each of them associated with ATES (Alcatel Espace), for the construction of Telecom 2 satellites, is that the Matra-ATES offer was accepted by DGT and the General Delegation for Weapons (DGA). The three Telecom 2 satellites, whose power and capacity will be more than twice that of their Telecom 1 predecessors, will fulfill the same tasks as the latter, which they will succeed at the end of 1991. This selection represents a breath of fresh air for space activities at Matra and ATES , joint contractors for Telecom 2.

The Telecom 2 program will assure for a period of more than 10 years, the continued operation of national telecommunication services and the installation of new services as part of a civilian and a military assignment.

On one hand, the civilian task will provide telephone connections and television distribution among the mainland and overseas departments, assuring the continuity of Telecom 1 services with clearly superior communication capabilities, and on the other hand, allow data transmission and television distribution with broadcasting, aimed essentially at mainland France and its neighboring countries, with communication capabilities clearly greater than those of Telecom 1.

Telecom 2's military task is the space portion of the Syracuse II program. It will assure the continued service provided by Syracuse I for the Ministry of Defense, while considerably increasing the system's transmission capabilities and its overall protection.

The experience gained with Telecom 1 has allowed the Matra/Alcatel Espace team to solve problems raised by the coexistence of three powerful payloads on a single satellite, payloads whose complexity involved the study and development of extensive equipment. The Eurostar platform perfectly meets the requirements of the payload and the constraints of the task, particularly regarding protection of the satellite in the space environment.

With a launching weight 1.8 times that of Telecom 1 and a lifetime 1.5 times longer, the Telecom 2 satellite will lift a payload three times as heavy and 3.5 times as powerful.

Telecom 2's payload will thus be the heaviest telecommunication payload developed in Europe.

Eager to establish a sound industrial organization, Matra and Alcatel Espace decided to install the Telecom 2 project in Toulouse, where they have all the appropriate space prerequisites (system teams, test and integration resources); this installation will assure the joint management of the program's different phases, from design to final integration.

Matra will concentrate on the platform; Alcatel Espace will manage and integrate the three civilian and military payloads at its Toulouse center. Final integration of the three satellites will take place at the Matra Espace location in Toulouse.

Alcatel Espace in turn, has invested heavily in the field of shaped antennas; the experience gained with Telecom 1 and later with Eutelsat II confirmed its competence.

For Telecom 2, Alcatel Espace will assure the fabrication of a large portion of the equipment, but has also selected to extensively subcontract the construction of payload equipment, thus demonstrating its ability to manage a complex development program for an international payload.

The choice of Matra/ATES to build the Telecom 2 satellites has bolstered the space activity of the two companies. For Matra, this choice is a sort of vindication with respect to its competitor Aerospatiale, which at the beginning of the year won the second generation Eutelsat satellite market. For Alcatel Espace, the DGT and DGA decision will stimulate an activity that had been idling—except for studies—for lack of a program.

11023

COMPUTERS

GDR: Robotron Director on S&T Relations, Possible Joint Ventures

25020028 Budapest MAGYAR HIRLAP in Hungarian 29 Dec 87 p 5

[Interview with Dr Walter Dieter, deputy director general of the Robotron Combine, by Laszlo Kulcsar: "A Dresden Conversation About Computer Technology; Where Should the CEMA Silicon Valley Be? As Long As COCOM Exists We Can Rely Only On Our Own Development"]

[Text] The Robotron Combine, with headquarters in Dresden, an enterprise embracing 20 producing units and developing with probably the greatest impetus in the German Democratic Republic, employs 70,000 people including several thousand especially well-trained engineers, mathematicians and programmers. In the electronics factory, standing in the heart of the large city on the Elba, we talked with Dr Walter Dieter, Robotron's deputy director general for science and technology. He was recently awarded the National Prize for his many decades of devoted work.

MAGYAR HIRLAP: It must be accepted as a fact that in computer technology also the CEMA countries are at a disadvantage compared to the developed capitalist countries; the backwardness is striking primarily in development and manufacture of personal computers and, of course, in the quality and price of these products. What is your opinion about this as one of the most involved experts of the GDR?

Walter Dieter: I do not deny the position formulated in your question. Not one of the CEMA countries plays a leading role on the world market for computer equipment. But I would immediately add that I am not inclined to grovel before anyone to get some sort of advantage. I am convinced that our camp includes proportionately as many clever and inventive minds as, let us say, the USA. The secret of those leading the profession today is that they purposefully organize their powerful intellectual potential. This is not ruled out for us either, we can learn from others, but we must be careful not to take over methods from others uncritically, but rather in accordance with the national peculiarities.

How Great Is Our Backwardness?

Our backwardness can be overcome in only one way, if we try with all our strength to see that the advantage of the others should not increase further to our disadvantage. The decisions pertaining to the electrotechnical-electronic industry of the GDR serve this goal. I estimate that we are 2.5-3 years behind the world level in electronics. There are those who speak of twice this much.

MAGYAR HIRLAP: What, concretely, would be needed to get ahead?

Walter Dieter: There is a very great need to get rid of the outmoded leadership methods of CEMA, to modernize the community, renewal and reform! Let me give an example. The West has created its own Silicon Valley. The people working there achieved the greatest progress in the past 10 years (in microelectronics). They collected the best minds and created the most ideal possible working conditions for them. I could imagine, because there is the greatest need for this, that the socialist countries also could concentrate their most outstanding developmental experts just like this at some place—maybe in the Hungarian Great Plain. Of course on the basis of the fullest equality in regard to work, investment and the fruits thereof.

MAGYAR HIRLAP: We hear that you are well acquainted with the Hungarians and with Hungarian conditions. What is your opinion about the Hungarian computer industry.

Walter Dieter: For a good 15 years I worked with Hungarian youth at the time of the GDR-Hungarian youth manpower exchange agreement; thousands of them studied and worked here at Robotron too. They were sharp and diligent girls and boys who got jobs in this very promising field on their return home. The Hungarian People's Republic has a number of productive, modern factories. I am thinking here primarily of Videoton, the MOM [Hungarian Optical Works] and the Telephone Factory. I am convinced that they are capable of much, but it is my feeling and experience that they do not exploit their possibilities enough! You might unite this potential to achieve certain goals. It is not my intention to pass judgment on organization in Hungary. But it is certain that in the present division of labor we cross each other up, not just you and we but the socialist countries in general. There is a lot of senseless parallelism; development and manufacture should be coordinated better than they have been.

MAGYAR HIRLAP: Why does computer technology represent such a small share of Hungarian-GDR barter trade and why is it even decreasing recently?

Walter Dieter: The needs and the interests do not meet. We want to sell something different from what the Hungarians would like to buy and vice versa. The other reason is that the developmental ideas have deviated from one another a good bit. Where are the good old ESZR [uniform computer technology system] days?! Different ideas have developed in regard to software and hardware alike. We have grown apart. Another problem is how to overcome the backwardness. According to us we must develop. We will have to depend on ourselves as long as COCOM exists. There are an awful lot of embargoed products and manufacturing procedures in electronics and information technology. And a demanding development cannot dispense with all those new

achievements which can be found in the world. At the same time, to rely only on what they may sell us is also senseless. The socialist economic community must develop a producing base founded on the newest developments. If this is not done within the shortest possible time all the developmental effort thus far could be lost.

You Hungarians buy everything ready-made from the West. But we ourselves produce even a PC which is among the most modern on the international market. We will put them on the market in a large series at the end of this year or beginning of next year. Small numbers could be obtained for a year already....

MAGYAR HIRLAP: Although the GDR has become a computer manufacturing power the tension between needs and the limited contingents in domestic trade is not decreasing. I have yet to see a personal computer, for example, in the display of a single speciality shop or department store, although according to press reports 10,000 of them have been made. Is there not a contradiction here?

For the Time Being on Consignment and Expensive

Walter Dieter: I recognize this problem too. Computers are offered very expensively here, on consignment. Their prices are not at all proportional to their use value....

MAGYAR HIRLAP: I might suggest that it is because there is a shortage of them in the GDR....

Walter Dieter: Yes, and this is why we have turned to the development of personal computers, or as we call them Heimcomputers. Just 3 years ago we made 500 of them and sold them primarily to schools, educational institutions and youth and pioneer houses. But we cannot manufacture enough parts to satisfy the great demand overnight....

MAGYAR HIRLAP: But 3 years have passed since the first series!

Walter Dieter: We turned with a request to the party and state leadership to support our personal computer manufacturing efforts from central resources in the future, for this is a sort of consumer article too. The capacity of our computers is 64 K bytes (like the Commodore 64—the editors) and we can sell them in the shops for about 1,800-1,900 marks (a sum equivalent to about 11,000-12,000 forints).

MAGYAR HIRLAP: Let us return to our own business! According to you what sort of cooperation is there between Robotron and the Hungarian enterprises? Do you consider it imaginable to have closer cooperation, even creating joint enterprises?

Walter Dieter: It is good in typewriter technology, not at all satisfactory in computer technology, but it could be improved substantially. We should harmonize some things to a greater degree—Which of us will manufacture what, what do we want to manufacture? Lest we offer each other the same products with our own trademarks. This will require the greatest sincerity and trust. Professor Tetenyi (chairman of the OMFB [National Technical Development Committee]) who visited us and his host Professor Montagh both emphasized that there is a need for a better planned division of labor, better thought out than it has been. We are not exploiting our intellectual potential (at the CEMA level) and our needs are constantly increasing.

A Joint Enterprise—With Permission?

Certainly cooperation must be made broader and more profound. But first we must work out the economic and organizational rules before we talk about a joint enterprise. It is in vain to have a car, gas and new tires on the wheels if we have not decided who will drive, where, on what road and how fast.... The responsible CEMA centers must work out the conditions.

MAGYAR HIRLAP: I have a different opinion about that. More than one joint enterprise, with a socialist or capitalist firm, it makes no difference, has been formed on its own conditions.... Does Robotron have a market strategy worked out for Hungarian conditions? For example, in your opinion, how many of your EC 1057 large computers could you sell us?

Walter Dieter: We have a very detailed and well-planned marketing strategy in regard to the Hungarian market. Our Budapest technical center is part of this; there is a similar one only in Moscow; we have regular exhibits of products in your country. We are trying to popularize products which could fit into the Hungarian computer inventory and which, of course, meet the needs. There is no sort of assortment restriction—we are offering everything from microwave radio technology through medium category computers to metering technology equipment and typewriters. Naturally the development of the Hungarian economy, which we watch with great attention, determines the sphere of our offerings.

As for the EC 1057, I think three to five computers of such large capacity could be placed in Hungary each year. I know that the price of products fundamentally determines sales. But we have a foothold in the Csepel Works and at Szamalk [Computer Technology Applications Enterprise]. We are also trying to satisfy Hungarian desires pertaining to peripherals.

8984

Hungary: ArchiCAD, Successful New Software

25020036e Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 23, 18 Nov 87 p 25

[Article by Tamas Kolossa: "The Graphisoft Success; The Advantages of a Disadvantage"]

[Text] ArchiCAD, Hungarian software which has not yet found a competitor in the West, is a hit product. For a while it didn't sell, apparently an idea which had miscarried. Out there a strange custom has developed; the designing offices either buy cheap programs for the 16 bit PPC's [professional personal computers], which are cheap there, or, in the event of more serious tasks, they buy 32 bit workstations, together with software. A cheap machine—cheap software; an expensive machine—expensive software. And there is a great empty space between the two. Apple did not have a computer larger than the Macintosh, so it did not have any really expensive software either. So it had to equip the Macintosh with greater capability. But, following the above line of thought, where in the world would it find a partner which had a small machine and—perhaps for this reason—large intellectual capital?

Here at Home

It was found in Zuglo. At first the Graphisoft experts did not really trust in success. They wrote the first version for Lisa, but at the end of 1984 this computer dropped from the popularity list. At the end of last year they made a Macintosh version. And in one year they sold 300 copies, half in the chief hunting ground of Apple, France and Italy, and the rest throughout Europe. And they are selling it for no less than 7,000 German marks. AutoCAD costs only 4,000 marks.

Of course, one must offer a lot for this price. ArchiCAD does not do the dimensioning in place of an architectural engineer, but it does automate the preparation of plans at a high level. The program does not simply draw lines; it depicts walls, in two or three dimensions as desired, even with shading. Putting the connections together is also the machine's task, and putting in doors, windows and other symbols. Using the measurement data one can easily prepare elevation drawings, sections, axonometric and perspective drawings, "naturally" with rotation, reflection and distortion possibilities. In addition ArchiCAD will list all elements figuring in the plan, with their designations, prices, materials and dimensions.

They also prepared an IBM PC/AT version of the program, but this does not mean that they can count on a real market here at home. The Hungarian engineer is too cheap for that....

At the time Apple took a look at the pipe network designing system of the Graphisoft Gmk [economic work association], and although it did not need this, it recognized in it the possibility of a great architectural package. With its three-dimensional display and coincidence test, the RAPID pipe designing system, written for a Hewlett-Packard computer, has a good chance for larger volume domestic sales. After the original Hewlett-Packard version they recently prepared an AT and even a 386 rewrite.

The Best?

BIGRAPH became a continuation of ArchiCAD. They hesitated to undertake this too, because they had no idea of trying to compete with such popular products, enjoying a large market, as AutoCAD and its fellows. But they finally did. And thanks to an Italian journalist who got them together with the Bieffe firm. The large Italian enterprise supplies its customers with office materials, from erasers to software. But they could hardly do really good business with the latter because they did not have their own, unique, possibly monopoly, products. So they were seeking unknown developers who could do something better than, for example, AutoCAD. Three years ago they began to finance the work of Graphisoft, with machines and hundred mark hourly fees—it is difficult not to call this to the attention of slave traders.... They put together a detailed needs list, and demanded a strict accounting. They were looking primarily for speed.

By November of last year they had finished a 1.5 megabyte code size program system containing a thousand independent routines, written in C for a minicomputer. The Italian firm sells it for 20,000 marks. So far they have sold 25 copies, so the developmental costs have been covered. At this writing there should be an AT version, at the upper limit of a PC, at a price of 8,000-10,000 marks, or about 300,000 forints.

So the Graphisoft Small Cooperative has thrown down the gauntlet before AutoCAD, CADdy and CADAM. President Gabor Bojar and his colleagues say that the price of their product will again be pretty expensive.

The only question is, when will they buy it here at home?

8984

Hungary: More Computer Systems for Agriculture

25020036c Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 23, 18 Nov 87 p 7

[Article by Huba Bruckner: "We Are Talking About Our Bread"]

[Text] Those in control and those in executive positions in Hungary already well know that agriculture and the foodstuffs economy therein can in no way do without electronification. Earlier forums in the series, organized always in a different city, have confirmed this and the gathering in Kaposvar this year did so as well.

The imposing large lecture hall of the separately located Animal Husbandry School of the Keszthely Agricultural Sciences University created a worthy environment for the plenary sessions and the organizers also saw to the clockwork precision functioning of all the programs.

Focal Points

Miklos Havass—first secretary of one of the organizing associations, the NJSZT [Janos Neumann Computer Sciences Association]—described in his exhaustive lecture the status of electronics and computer technology therein as the branch of industry which is developing most dynamically. He said that between 1983 and 1987 electronics production throughout the world more than doubled (from $360 billion to $782 billion) and computer technology became its most important branch with a share of 29 percent.

The first secretary of the NJSZT emphasized that in an age of ever accelerating model exchange, ever greater integration and special purpose circuits one cannot follow a policy of "piddling." One cannot keep pace in this way with a product life cycle of 9-15 months. The primary goal may be effective use of finished devices, and the basic software must be treated as a part of the device. The goal and the task is to satisfy real applications needs.

"Agriculture has gotten beyond the Commodore craze. For the computer technology tasks of large production systems one needs not only IBM PC type machines but also networks of them or large computer tools," Miklos Havass said among other things.

Reflecting Changes

Vince Hanyecz—one of the initiators and organizers of the forums—urged those present to work effectively, summarizing the experiences of the past five programs. The forums gave a faithful picture of the computer technology situation of agriculture , and so by reviewing them one can follow the processes and changes.

In his lecture he singled out a few favorable experiences. Increasingly more organization by agricultural firms themselves is replacing system organization done (expensively) by outside organizational institutions. The computer inventory is developing further in the direction of IBM PC, XT and AT machines; personal computer LANs and large computer-small computer network systems have appeared; and integrated production control applications are seeing the light of day. The number of computer technology experts employed in agriculture is increasing, but the material and moral recognition given them is frequently inadequate.

The speaker evaluated as favorable the increasing number of those attending the forums and the atmosphere which sometimes encourages debate and the analysis of problems. But he deplored the lack of an exchange of experiences, and products, and greater publicity for viewpoints taken by the participants.

The Lectures

Only the number of lectures may be increasing more quickly than the number of participants. This year there were 102 lectures. The work of the section describing the data processing environment of agricultural organizations was the most interesting—for this reporter. This section dealt with the role and developmental plans of the MEM [Ministry of Agriculture and Food] Stagek [Statistical and Economic Analysis Center] (for example the intention to install the country's first ESZ [Uniform Computer System] 1057 computer), with the plans of the Post Office to develop the information infrastructure, with its role in disseminating video newspaper market and meteorological information and with a new school subject called veterinary informatics.

A number of lectures dealt with automation, with development of and experiences with integrated enterprise information and production control systems, with various software products, computerized wage accounting and record keeping.

Two examples proved that the C-64 can be useful in an agricultural service. One was an image processing system for the meat industry which uses a Commodore, supplemented with a card to digitize a video signal to measure various fields and distances. Instead of manual calculations of the fat/meat or air/meat-mass ratios the video camera looks at the slice to be measured and the computer does the drudge work. In the distance measurements—the other application of the system—one can calculate the length of a thousand curves in an eight hour shift.

The other example is to the credit of the conference organizers. A Commodore computer warned the speakers to keep to the precise lecture time. The program, started at the beginning of the first lecture, displayed an hour glass; the sand "flowed down" in 10 minutes, which was the time allowed for speaking. Then the chairman got 5 minutes for questions, and then the hour glass appeared again.

A dozen exhibitors showed primarily software products—including a wage grossing program written for a Commodore (so, the C-64 is good for this too!). But we could also see a "sharpening" screen which could be installed in front of the picture tube and we could wonder at the ASY-16 multi-user super microcomputer produced by the Peace Agricultural Producer Cooperative in Zagyvarekas.

If this superbly organized conference is a faithful picture of the work style of agriculture, then electronification is a good investment here, and we will have bread in the future too.

8984

Hungary: Acoustical Modem Produced in Series

25020036g Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 23, 18 Nov 87 p 12

[Article by Tamas Kolossa: "Acoustic Modem"]

[Text] Originally it was intended for amateurs. Now, with increased interest on the part of professional users, the Coopinform Computer Technology and Organization Subsidiary has begun series manufacture of the first domestic acoustic modem.

The device was exhibited for the first time last year at the Szarvas computer technology academy. It was discovered there how many people need this method of remote data transmission. They spent the past year reworking plans to meet the new needs, maintaining the goal of offering a cheap modem made of domestic parts. In the interest of this they studied a number of foreign products and a number of domestic parts which are quite difficult to get.

Finally, because of the professional requirements, they decided to develop their own one percent tolerance RC filters. The modem converts the computer signals into acoustic signals according to the CCITT V.21 standard so they can be forwarded on a telephone line. The device can be connected to any computer or other data transmission device which has a standard RS 232 output and suitable connector.

The modem can attain a transmission speed of 300 baud, in accordance with international standards, even in the duplex mode. This means that a one kilobyte data volume can reach the target station, with the necessary checks, in about a minute and a half. Neither the acoustic principle nor the quality of domestic telephone lines make possible a greater speed. No one should expect miracles from this device. If you are sending more than 3-10 kilobytes of data per day you should give real consideration to the economy of the solution, figuring in the costs for a telephone line.

Developmental engineer Illes Bodor solved the RS 232 connection to an IBM PC and a Commodore-64 and prepared the transmission program. They will also undertake to write supplements according to user needs.

Manufacture of the first 700 unit series has begun at the Lignifer Industrial Cooperative. If subscription orders do not exhaust the series, sales will begin soon at an expected price of 17,000-18,000 forints. There is already great interest in the device. The KISZ [Communist Youth Federation] CC has ordered 50 units and they are talking about more extensive use.

8984

Hungary: Firm To Coordinate Application of CAD/CAM Systems

25020036a Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 23, 18 Nov 87 p 5

[Article by Szilard Szabo: "A Prime Contracting Office for CAD/CAM Systems"]

[Text] The Innovation Prime Contracting Organizational Systems Office (abbreviated Innova-CAD) has been formed on the basis of an agreement between the Ministry of Industry and OKISZ [National Federation of Artisans Cooperatives]. The office operates under the patronage of the PerComp Deposit Association and the Instrument Technology Small Cooperative provides the mechanical and organizational conditions needed for operation.

The purpose of the new office is to coordinate application of CAD/CAM systems. Its tasks are to develop standard hardware tools and produce a compatible software assortment, to create model systems, provide consulting and planning services and to deliver and put into operation designing systems based on Intel and Motorola chips.

Antal Adam, chief of a main department in the Ministry of Industry, related the creation of the office to the structural transformation of state large industry and support for the cooperative industry. It is his judgment that internationally accepted achievements can be attained in our country in regard to CAD/CAM systems.

Gabor Szeles, president of the Instrument Technology Small Cooperative, said that in the first 3 weeks of its existence the office received orders worth 20 million forints and counts on trade worth 80-100 million forints even this year. This would not be a determining factor in the one billion forint trade of the small cooperative but further expansion can be expected.

Customers include Vati [The City Planning Institute], Eroterv [Power Plant Designing Enterprise] and the Petroleum Industry Machine Factory. A network consisting of 160 machines, delivered for the Paks Nuclear Power Plant, is considered a significant professional achievement. With its aid they were able to make a general overhaul of the second block 10 days more quickly and thus the system has already paid for itself.

Their cooperating partners include the Budapest Technical University, the Miskolc Heavy Industry Technical University and the Cartography Institute.

The Instrument Technology cooperative is continuing to manufacture 16 and 32 bit engineering workstations. Their offering includes a high resolution monitor, a digitizer and a plotter. They hope that the plotters being manufactured by FOK-GYEM [Precision Engineering and Electronic Instruments Manufacturing Cooperative]

can replace the equipment manufactured by Hewlett-Packard. They get special equipment from the West but they also cooperate with ITEX and the Press Industry Association. In their opinion laser printers may be profitable for larger designing institutes.

Their tasks are to find, apply and further develop domestic CAD/CAM software and to obtain indispensable professional designing systems and sell them in Hungary. They feel that some domestic CAD/CAM software could be competitive abroad also.

Among other things instruction is also given in the exhibit hall at the Szallas Street site of the Innova-CAD Office.

8984

Hungary: Packet Switched News System

25020036f Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 23, 18 Nov 87 p 12

[Article by Huba Bruckner: "Packaged News"]

[Text] Data transmission is a fundamentally important component of the informatics infrastructure. It can be done primarily on line switched or packet switched networks. At present the line switched network of the Post Office—generally referred to as the NEDIX network—has 300 subscribers, with 400 waiting to be connected. Satisfaction of demand is continuing and although the capacity of the switching center has been expanded in the meantime, it already appears that the rate of growth of the number of applicants is greater than capacity expansion can keep up with.

It is reassuring news that the Post Office is also working on building up a packet switched network. The null phase of the work is represented by testing of an experimental center suitable for serving a maximum of 24 lines, a center developed by SZTAKI [Computer Technology and Automation Research Institute] and based on a TPA-70 computer. Jointly with the Soviet Union and the GDR they are also doing international traffic experiments with a packet switched network that offers a telecommunications background for a scientific research and technical development information infrastructure.

In the next phase of building up a packet switched network—again based on developmental work by SZTAKI—they intend to build a system serving several hundred subscribers.

It holds back dynamic development that for the time being one cannot get modern packet switching technology from abroad (it would help if they would raise the embargo limit to a performance level of 1,000 packets per second). In any case the ultimate goal is to realize a large capacity national network built on a modern packet switching center.

A contract pertaining to delivery of a postal public videotex system was signed one year ago. It will be possible to access this large scale information system with a local call from any point in the country; it will be built on switching center and network elements made by Siemens and the English GEC (General Electric Company). The capacity of the center will be one thousand lines; we hope that there will be domestically developed versions in addition to the MUPID intelligent terminals (Austrian).

8984

Hungary: Full Line of Computer Components From the Telephone Factory

25020036d Budapest
COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 23, 18 Nov 87 p 12

[Article by Attila Kovacs: "Everything for the Network"]

[Text] With the exception of the computer, the Telephone Factory now manufactures or is developing virtually every element for ESZR [Uniform Computer System] large computer networks (IBM compatible). They offer a remote processing processor, a multiplexer, a group or individual line connector, a terminal and an 8 bit (CP/M compatible) personal computer and most recently a 16 bit (PC/XT compatible) personal computer both of which can be used as an intelligent terminal. The goal of the enterprise is to produce products which can be produced economically, requiring little import, which can be sold on capitalist markets in greater numbers than at present.

"In the computer technology line we are still basically interested in remote processing systems, but we have set ourselves the goal of increasing the speed ranges," said technical director Imre Purger at the opening of a technical day introducing the firm. "So far we have dealt only with leased line or connected line networks; now, in the framework of cooperation with MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences], we would like to begin manufacture of the more modern packet switched network elements (WANPBOX)."

At the technical day we also learned that this summer they made a prototype of the TCT 3720 programmable communication control. They are manufacturing fifteen of them this year and have already sold four to the Soviet Union. One can create national scale networks with this device. It is characteristic of its complexity that a single machine contains 3,500 integrated circuits. A distant version of the device can be expected next year and by the beginning of the 1990s, on the basis of an OMFB [National Technical Development Committee] contract, there will be a so-called multiregional remote processing processor.

On the basis of know-how purchased from the Instrument Technology Small Cooperative they have started manufacture of IBM compatible Terta PC's; these will appear at the end of the year. They will market the TPC-XT personal computers supplied with various supplementary services (speech synthesizer, IBM 2780-3275 terminal emulation, dynamic character generator, LAN connector, etc.).

Also this year they are finishing development of remote group terminals corresponding to the IBM 3276/78, and local group terminals which can be connected to the multiplex channel of large computers will appear in the near future.

As a further development of the TAP 34, a CP/M machine, they are creating a teletype concentrator which can collect information from telex machines at the lowest level of a hierarchical network, evaluate it and forward it to a higher level.

Terta [the Telephone Factory] is also planning to produce a 2400 bit/s modem based on a signal processing microprocessor and capable of automatic call and compensation. Finally, in the first half of next year one can expect the TMT matrix printer family to be expanded with a new member—preloaded with individual sheet feed.

8984

Hungary: Health Center To Get VAX Based Information System

25020036b Budapest COMPUTERWORLD/SZAMITASTECHNIKA in Hungarian No 23, 18 Nov 87 p 6

[Article by Marton Vargha: "Computer Technology in the Hospitals"]

[Excerpt] This year they reorganized the central computer information system for Hungarian health affairs. The tasks of the former Health Affairs Computer Technology and Information Center, ESZTIK—and the institution itself—were divided up into several parts. They created a Health Affairs Informatics and Computer Technology Institute and in Szekszard, at the Tolna County Hospital, they created a Ministry of Health Information Center for Medical Services. It is reported that they will soon get a MiniVAX computer.

8984

MICROELECTRONICS

Hungary:MEV Microelectronics Operations Profiled

25020024a Budapest HIRADASTECHNIKA in Hungarian No 10, 1987 pp 433-434

[Article by Gyorgy Wollitzer, Microelectronics Enterprise: "Introductory Thoughts"]

[Excerpts] In this special issue, and in articles shifted to subsequent issues of HIRADASTECHNIKA because of lack of space, we have tried to give a comprehensive picture of the activity of the MEV [Microelectronics Enterprise] which extends—in addition to microelectronic parts including semiconductor devices, hybrid circuits and sensors—to measurement technology, the development and manufacture of automatic measurement devices, some machine industry products and robotics.

In the special issue it was not possible to give a complete picture of all semiconductor development and manufacture. The picture given is a simplification of the prevailing situation. Work connected with catalog circuits and the development of discrete semiconductors is more difficult to publish, but in recent years we have raised and are raising a number of new technologies in the area of discrete devices to the manufacturing level.

In addition to catalog circuits, the MEV also deals extensively with the development of semi-custom (equipment oriented) circuits.

Hybrid integrated devices constitute a no less important group of microelectronic parts, in addition to semiconductor technology. The MEV places great emphasis on the continuity of development in this area. In accordance with our earlier mission, the level of our expert staff and the technical possibilities we are seeking more complex tasks.

The effect of semiconductor and hybrid technologies on one another is ever more significant. In our developmental work we expressly seek those areas which can be called common ones, and so, those hydrid circuits which "know" the most are made with semiconductor IC chips designed for this purpose. Moreover, multilayer hybrid technology can provide semiconductor technology with complex connecting systems or capsules resulting in great surface and volume yields. Both tasks constitute a focus of our developmental work to be implemented in the near future.

Sensors constitute the newest class of microelectronic components. These include both semiconductor and film technology solutions. Some of the results of developments using high energy are already accessible—pressure, light, temperature and gas sensors. The summary describes developmental and experimental manufacturing work being done in this area.

The articles, which are deliberately design oriented, illustrate only indirectly the great technological development program which constitutes the basis for implementation.

In technological development work and in the studies connected with it—primarily in material structure studies—the MEV cooperates with several research institutes and faculties. We should specifically mention the productive contacts—contacts which have existed for years— with the KFKI [Central Physics Research Institute], the MFKI [Technical Physics Research Institute],

the institutes and faculties of the BME [Budapest Technical University] and with Kando College in the area of microelectronic technologies and special studies.

Testing the finished components is an indispensable phase of the technological process, one demanding ever greater intellectual and technical preparation. One of the articles describes internationally recognized work in this area.

Taking into account the scope of available space, less than the necessary space is allotted to this special field for working on measurement technology, machine manufacture and robotics, which make up about half of the activity of the enterprise.

For more than 15 years, the development and manufacture of integrated circuit testing systems has been an important area of activity for the MEV. The chief developmental direction here is understandably—because of the growth in the complexity of monolithic circuits—the testing of ever more complex circuits and increasing the testing rate. The growth in complexity makes demands not only on the hardware providing the electrical environment for measurement but also upon the operating software.

The last group of articles describes one of the elements in the development and manufacture of equipment connected with the technology for microelectronic components, equipment which can be used in other areas as well. The article describes the operation, structure and application, in semiconductor technology, of the Penning discharge cathode sputtering source which can be used in semiconductor and hybrid technology as well as in the manufacture of magnetic disk memories. The generation of the magnetic field of the sputtering source is protected by patent.

With the articles in the special issue and those to appear later for reasons of space, we intended to give a cross section of the work being done at the MEV, primarily that connected with semiconductor technology but not exclusively with component development. We hope that this will call attention to the fact that, on the basis of the well known resolution of the Council of Ministers, a considerable concentration of engineering strength has come into being at our budding enterprise. The special issue may also help—if but to a small degree—to get people to recognize the goals, work and achievements of a new enterprise.

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Hungary: MEV Produces New Semicustom IC, "LIDI"

25020024c Budapest HIRADASTECHNIKA in Hungarian No 10, 1987 pp 447-451

[Article by Marton Mehn and Istvan Gergely, Microelectronics Enterprise: "LIDI—A New Bipolar Semicustom Circuit"]

[Excerpts] Summary

The LIDI is a new member of the bipolar semicustom circuit family of the Microelectronics Enterprise. Like the preceding member of the series, the LINA-1, it makes possible the rapid production of integrated circuits of small and medium complexity.

Of the two semicustom circuits, the LIDI should be chosen if the connection to be integrated requires a supply voltage between 20 and 36 V or if it requires n-p-n transistors with very small residual voltage.

1. Introduction

The LIDI, one of the newest semiconductor products of the MEV [Microelectronics Enterprise], belongs in the group of bipolar semicustom circuits. In terms of its internal structure and use, it is similar to the LINA-1 circuit, also made at the MEV, but its scope of application is broader. We will describe below the chief characteristics and potential applications of this new circuit. A diagram of the chip can be seen in Figure 1.

We should note that, disregarding minor details, what has been said in the cited articles about the use of the LINA-1 circuit also applies to the LIDI, so in the present article it is not necessary to go into detail with regard to applications.

2. Circuit Component Assortment and Arrangement

There are 194 circuit components (transistors and resistors) and 16 thermocompression contacts on the LIDI chip, which is 2.05 X 2.15 mm in size. The distribution of components is as follows:

-50 small n-p-n transistors;

-16 two-collector lateral p-n-p transistors;

-15 200-ohm resistors;

-30 450-ohm resistors;

-28 900-ohm resistors;

-29 1.8 kiloohm resistors;

-24 3.6 kiloohm resistors; and,

-2 60 kiloohm resistors.

Disregarding the last two members of the list, the resistors are placed on a common island. With the aid of the +V contacts, this island can be biased relative to the substrate or the resistors.

The resistors are so arranged that any one of those from 200 to 3600 ohms can be accessed in the vicinity of every single transistor. The 60 kiloohm resistors—like the transistors—are located on an independent island. In regard to the former, these resistors, formed from the

epitaxial layer, can really be regarded as JFET transistors whose gate electrode is the substrate. This circumstance influences their properties and potential applications to a significant degree.

The orientation and dimensions of transistors of the same type coincide over the entire chip so that, within a good approximation, their characteristics can also be regarded as identical. As an exception, there is also an n-p-n transistor (of different size than the others) within the resistor island; but, the manufacturer uses this to check the chip so it cannot be used in the circuit (although we can use its collector as a +V contact). In the lower left corner of the chip, we find additional elements important only to the manufacturer. These make possible a precise fitting of the masks to the figure formed on the wafer.

3. Electrical Properties of the Components

The transistors and resistors of the LIDI are similar to the corresponding elements of the LINA-1 with regard to both their size and their electrical properties. So, in what follows, we will mainly discuss the differences. We should note immediately that the most important difference pertains to the maximum voltage which can be used. This is 20 V in the case of the LINA-1 while it is 36 V for the LIDI.

The permissible dissipation is the same as for LINA-1 circuits—viz.,0.5 W, presuming an ambient temperature lower than 70 degrees Celsius. There is no requirement that the heat generated in the chip be distributed evenly over its surface. The maximum rated power can occur even on a single element.

4. Applications of the LIDI

As we have noted, the name of the new circuit derives from the words "linear" and "digital" to show that the LIDI is suitable for the manufacture of analog, digital or mixed operation circuits. As applications examples, we might mention amplifiers, comparators, power sources, frequency distributors, gate circuits, oscillators, phase detectors, timing circuits, digital-analog, temperature-current and other transformers or more complex connections built into similar partial circuits. Although the element set available limits the scope of connections which can be integrated into circuits containing relatively few elements, a number of tasks arising in practice can be solved with the aid of the LINA-1 or the LIDI. A choice between the two semicustom circuits is influenced primarily by the number of transistors to be used, the supply voltage range desired and the requirements imposed upon the residual voltage of the npn transistors or the permissible terminal voltage of the large value resistors.

Whether we select the LINA-1 or the LIDI for solving the given task, the course of the rest of the work is essentially the same. The situation is simple if we already have suitable circuit terminals. In this case, we prepare a metal network diagram corresponding to the circuit diagram on an enlarged diagram of the given semicustom chip (this diagram can be obtained from the MEV). When doing this work, we must be careful that the line follows only the path drawn on the chip diagram with a broken line.

It facilitates the design of the connections if we break down the given circuit into natural functional units, designating the chip area intended for the units and planning the metalling [?plating?] by unit, one after another. It is helpful to check the proper operation of the connections by building a mock-up, using the corresponding parts in the model (if the LIDI is being used there is a LIDI kit). The elements available in the LIDI kit are shown in Figure 2 (H1 through H6). As we can see, the transistors figure in the kit in various combinations and we can find in it all the types of resistors which are on the chip.

Preparing the diagram and preparing and checking the model can be entrusted to experts at the MEV. Naturally it is also possible to submit only the desired function and the requirements to be made of the circuit to be designed, or to work out in cooperation with the chip manufacturer an integrated connection suitable for solution of the given problem.

Finally, let us illustrate the utility of the LIDI by describing a high precision voltage comparator which can be built with it. Although the component requirements of the circuit far from exhaust the possibilities of the LIDI, since it uses only a small part of the available elements (e.g. only 17 of the 66 transistors), its electrical characteristics are very favorable—a large input resistance, amplification and operation speed, a broad supply voltage range, small heat sensitivity, TTL compatibility, etc.

Biographic Notes

Marton Mehn is a graduate physicist, a semiconductor technical engineer and a special engineer in electrical engineering and mathematics. From 1962 to 1982 he dealt with development of semiconductor devices at United Incandescent. In 1978, on a UNIDO scholarship, he studied MIS structures in the FRG. Since 1982 he has dealt with design of bipolar integrated circuits at the MEV and also leads a laboratory practicum at the Lorand Eotvos Science University.

Istvan Gergely went to United Incandescent in 1957 after earning a chemical engineering degree. He dealt first with preparation and study of germanium monocrystals and then joined in the work of the department preparing semiconductor devices. In 1975, on a UN scholarship, he made a study tour of England. He has worked at the MEV since 1982; at present he deals with design and structural study of semiconductor devices and the checking of semiconductor technological processes with the aid of test diagrams.

8984

Hungary: Strategy for Semiconductor Digital Signal Processing Devices

25020024d Budapest HIRADASTECHNIKA in Hungarian No 10, 1987 pp 453-454

[Article by Dr Tibor Tuzson, Microelectronics Enterprise: "General Questions of the Development of Semiconductor Digital Signal Processing Devices"]

[Excerpts] Summary

The article summarizes the thinking which has developed at the Microelectronics Enterprise pertaining to the development of digital signal processing IC's. It establishes that in modern VLSI development the importance of the algorithm, of systems technology (structure) design, will be crucial because in this way one can create circuits optimal for the given task. The new, multidisciplinary development strategy is qualitatively new and requires the formation of creative collectives based on specialization and cooperation. Taking our conditions into consideration there are prospects for prefabricated equipment oriented (semicustom) circuits and for bit parallel and bit sequential macrocell approaches. These supplement one another and other articles in the present issue will deal with them in detail.

Biographic Note

Dr Tibor Tuzson was born in Kolozsvar [Cluj] in 1947 and graduated from the Bucharest Technical University in 1970. At present he is a group chief in the semicustom circuit designing department of the Microelectronics Enterprise. His chief interests are digital signal processing and devices for it; he is author or co-author of a number of lectures and notes for the further training of engineers in this field; he has read papers at a number of Hungarian and foreign conferences. He earned the title of university doctor in 1985.

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Hungarian Researchers Test Microelectronic Devices for Reliability

25020024f Budapest HIRADASTECHNIKA in Hungarian No 10, 1987 pp 461-472

[Article by Dr Albert Balogh, Imre Goblos and Istvan Varadi: "Reliability Tests of Microelectronic Devices at the MEV"]

[Excerpts] Summary

The article provides a review of reliability testing methods at the MEV [Microelectronics Enterprise]. It describes the testing equipment available. It summarizes methods for evaluating and communicating reliability data. It outlines a computational procedure for the reliability of equipment using data on parts.

Biographic Notes

Dr Albert Balogh is a mathematician and a candidate in technical sciences. He has dealt with an evaluation of the reliability of electronic parts at the HIKI [Communications Engineering Industry Research Institute] since 1961, then at the MEV since 1982, and is at present deputy chief of a main department. He has to his credit more than 50 publications on the theme. In 1981 he received the EQ prize of the journal EOQC QUALITY. He is chairman of the Reliability and Quality Committee of the HTE [Communications Engineering Scientific Association]. He received the Tivadar Puskas prize in 1976 and the Pollak-Virag prize in 1986.

Imre Goblos is an electrical engineer and has dealt with the development of test methods for electronic parts at the HIKI since 1964, and at the MEV since 1982. He has given a number of lectures on the theme and has ten publications. As secretary of the Parts and Primary Materials Department of the HTE he is organizer of the annual Parts Seminars. He is an outside lecturer for the Electronics Technology Faculty of the Budapest Technical University. He received the Tivadar Puskas prize in 1987.

Istvan Varadi is an electrical engineer and special reliability engineer. He has dealt with computerized processing of reliability data since 1974 at the HIKI, later at the MEV, and is at present a group chief. He has provided nearly ten lectures or publications on the theme. He is a member of the Reliability and Quality Committee of the HTE.

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SCIENCE & TECHNOLOGY POLICY

Hungary: Ministry Official Stresses Need To Develop S&T Resources

25020030a Budapest DELTA IMPULZUS in Hungarian No 1, 16 Jan 88 pp 8-9

[Interview with Peter Reiniger, chief of the Technical Development Main Department of the Ministry of Industry, by Tibor Szentgyorgyi: "To Preserve Resources; To Develop, Select and Apply"]

[Text] The economic forecasts do not promise much good for the year now beginning. And yet industry must develop, it cannot sleep a winter dream. Life must be aroused especially in the research and development sites—there is no development without technological renewal. I asked Peter Reiniger, chief of the Technical Development Main Department of the Ministry of Industry, whether it would be possible to keep technical research and development at least up to level.

[Answer] According to the position taken by the Science Policy Committee we must preserve the real value of central technical development sources in 1988. In 1988

there is a 3.1 billion forint central technical development fund at the disposal of the Ministry of Industry, which naturally is little compared to our needs but it corresponds to the realities in the present situation of the economy. The question is, How will we use it? In my opinion we must look not only at what resources are at our disposal but also at what the tasks are for which the necessary resources should be provided. When financing technical development we must reckon not only with the central technical development fund and the enterprise sources but also with the fact that with the reorganization of the banking system the enterprises can also call on many banks which want to provide credit for technical development.

In the past year and a half we greatly increased the ratio of bank type financing when augmenting the central technical development fund. In 1988 the Industrial Development Bank will finance all our OKKFT [National Medium-Range Research and Development Plan] and ministry programs. We have set up extraordinarily strict efficiency requirements and have increased the ratio of repayment contracts. We want to realize a technical development policy centered on undertakings, where economic tools also aid realization of development policy. To do this we must create—among other things—institutions which aid the founding of enterprises, the creation of partnerships, the organization of innovation parks and the organization of consortiums for certain developmental actions, and there are certain sorts of resources available for this. Technova, which since 1 January has been operating as a joint stock company as the Industrial Development Bank, is already conducting such activity. Just as examples let me mention the Northern Hungary Innovation Center, the Manufacturing Automation R&D Association or Vienna Trade. Beginning in 1988 they and a few other similar financial institutions will have the opportunity to work with venture capital as well. This is a new element in financing, a force which multiplies resources. In regard to enterprise resources for technical development we cannot reckon with sure plans today. On the one hand, because of the modernization of the tax system, the enterprise plans require further refinement. On the other hand the obligatory generation of a technical development fund at the enterprises has ended. I consider this latter step as giving the enterprises decision freedom in a very important area and I believe the enterprises will see, and not only in the research intensive areas, that an acceleration of technical development work, and generating the resources for it, is necessary for their survival and development.

In any case, 1988 is an extraordinarily important year from the viewpoint of financing technical development, because after a struggle lasting several decades we have succeeded in incorporating into regulation systematic elements which will expressly aid the industrial introduction of technical development achievements. Such an essentially new element, for example, is the fact that ten percent of the average of three-year technical development expenditures can be turned tax-free to investment goals, for the industrial application of research and technical development achievements. Essentially this is a profit tax concession, and it expressly serves the introduction of R&D achievements. A similar concession aids the application of certain electronic devices. It is a fact, unfortunately, that tendencies opposed to this will also come into play beginning in 1988, primarily because of the turnover tax burdening investments. Despite the worsening circumstances we succeeded in maintaining the profit tax concession for technical development enterprises or for their activities—along with a number of other incentives. Today this may mean a little more than money.

1987 was the first year when institutions having a technical development fund, like the Ministry of Industry, also had a sequestered foreign exchange allotment for technical development. This possibility remains in 1988. We had about 5 million dollars for this purpose and I hope it will be as much in 1988. This is important also because we have big problems in the infrastructure for research and development (instrument supply, computer supply, materials, etc.) and this also plays a role in the way some well trained people are leaving industry, the large industrial research institutes and the Academy institutes, some to undertake work abroad individually and some going into small organizations to work.

The organizational system for technical development has gone through significant changes in recent years—and this is natural. This change started with the formation of the technical development enterprises. The matter of small organizations dealing with technical development or working in intensive technical development areas is an extraordinarily important element of this process. We should try to mobilize all those forces which aid the technical development culture of industry. We are absolutely neutral in every competition; we do not look to see if a small organization or a large enterprise is involved; rather we look at the concrete tasks and results. We have signed many agreements with various small organizations (e.g., Instrument Technology, the Percomp association, etc.). We have developed an innovation alliance policy, we want to be allied with and are allied with all those who can be our partners in the interest of the technical development and structural transformation of industry. Another factor connected with the organizational system is that the Science Policy Committee has a program for the development of the infrastructure for research and development; the OMFB [National Technical Development Committee] is guiding implementation of this program. Within the programs managed by the Ministry of Industry also we are financing and supporting, not only materially but also morally, development of the infrastructure in very many areas. Accepting employment abroad is closely interdependent with domestic research conditions; very many are going out not because they can earn more money but rather because they can work with a different instrument park

under different laboratory conditions, can get access to information better, etc. Although I think such healthy mobility is certainly good (from the viewpoint of international cooperation) still we must create conditions for researchers here at home so that the lack of an instrument and laboratory background should not be an obstacle to work.

The priorities set by the Seventh 5-Year Plan have not changed; they are valid in 1988 too. But we must talk about certain course corrections. The most important task of the first 3 months of 1988 will be a review of the central economic development programs, including the OKKFT programs. Everything which apparently will not bring results must be eliminated and the resources must be concentrated on a more effective area. One very important ordering principle in the review of the programs will be that they should improve the balance within a very short time. The preference system for the programs has changed, and this also requires a certain re-ordering.

People frequently criticize this principle of short-term returns saying that we are risking the future. We must find a rational ratio between short-term, medium-term and long-term research within applied research—just as between basic research and applied research. The short-term successes have more importance today because if these do not bring results then there will be no assets for medium-term research. I would like to point out that technical development policy has a very well thought out and very good priority system which was formulated in the OKKFT programs. It was worked out by a broad sphere of experts and approved by the Council of Ministers. Within this determining the concrete developmental actions is basically the task of enterprises, program councils and program managements subject to market effects. We have developed a system in which the program councils and professional councils publish competitions, judge them and decide, within guidelines approved by the program leadership, which action should get preference. There is a way to select the best, because competitions amounting to six forints per one forint of central money were received in the factory automation program, for example. This also justifies, during the 1988 review work, having more interbranch projects, projects affecting several branches, in place of branch type projects.

If we compare our priorities, our chief technical development trends, with Eureka or with the integrated CEMA program for the year 2000 then we will find a very high degree of agreement in practice. The problem is not with the goals set but rather with execution. Everyone in the world has set these priorities and it is a fundamental condition for our competitiveness that we make execution of these programs more effective.

The role of engineers is being ever more highly valued. I am convinced that we can solve the qualitatively new tasks standing before us only hand-in-hand with the engineers. There is no doubt that the technical intelligentsia is the motor of technical development, of technological renewal. At the same time I must add—however unpopular a role I may be assuming—that the international market has formed a value judgment about the competitiveness of our industry, the quality of our products and their technological solutions which also expresses the significant deterioration in the terms of trade which has taken place in recent years. In this way the world market also judges indirectly the work of our engineers. In the period ahead the technicians must do more to bring out more innovative, more economical, more competitive products, and they must create new products even under the existing conditions. It is the task of industrial guidance to ensure the conditions and develop a social-economic environment friendly to innovation.

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Lack of R&D Funds Drives Hungary To Seek International Ties

25020027 Budapest MAGYAR HIRLAP in Hungarian 28 Dec 87 p 4

[Article by Erika Zador: "International Contacts of Domestic Research; The Advantages of Being of Age"]

[Text] Technical development and innovation are among the most important key words for progress, but it appears that the tight economic necessities hinder devoting larger sums than earlier to this area. Indeed, as the president of the Academy recently said, the sums devoted to research and development have decreased by 30 percent in absolute value in 2 years. To anticipate the assertion that even so there is enough research and that the country sacrifices a great deal for R&D activity let me cite here an article which appeared in the November issue of MAGYAR TUDOMANY according to which we are only in the middle field in this area and efforts will be needed just to "run in place."

Under such circumstances it is cause for encouragement that our international scientific contacts are increasing nicely. One of the keys to this positive phenomenon certainly lies in the open foreign and domestic policy of our country, greatly valued even internationally, but no less important is the healthy decentralization which has taken place in the area of international contacts, something which would be just as salutary in other areas of social life.

Good for Whom?

At present, for example, the Academy alone (it is one of the national organs guiding research) has more than 50 international cooperation projects. And even a single individual can initiate such cooperation. It is thanks to this favorable atmosphere that while the sums which can be turned to travel have decreased, and they have lost their value too because of the multiple devaluations of

the forint, still about 60 percent of the researchers have been abroad. In many cases without using a single penny of foreign exchange, within the framework of an invitation or exchange agreements not involving foreign exchange.

The question arises, For whom is it good, beside the researchers, that they travel so much?

In the first place it is good for the country. Science is international and even large countries build to a very large degree on international cooperation (it is enough to cite here the Eureka Western European research program) not to speak of a country the size of ours. There are branches of science which can be cultivated only through international cooperation. But, as we mentioned, in the present situation of our country the international contacts are called on to supplement, to a certain degree, the very weakly trickling material resources.

An example comes to hand. Computers similar to or larger than the always overburdened large computer of the Academy can be found today in every Western university and research institute; they are less burdened and easier to access. Obviously the country does not now have enough money to buy a new and larger computer, but with the aid of telephone lines many researchers have direct access to foreign computers. Either because they themselves spent more or less time there earlier or because they have a cooperating partner there. But the same thing applies to use of very expensive instruments. A Hungarian researcher can make his measurements abroad within the framework of an exchange not involving foreign exchange.

Contract Research

Contract research done on a foreign commission is a relatively new way to exploit international contacts. Today on the average only 35 percent of the expenses for domestic research are covered from budget sources (only 15 percent in institutes which "earn well"!) and the rest must be produced from contracts. The link between research and application is naturally welcome for, understandably, a good number of the contracts pertain to enterprise, everyday enterprise, interests, for it is not the task of the firms to provide central support for R&D strategy; so the researchers are forced to solve routine tasks not at all requiring their intellectual capacity. And since research also requires foreign exchange more and more institutes are looking for foreign commissions—which is made possible by their system of contacts, their level and their international prestige.

These efforts are truely successful if the researchers of the institute build themselves into the international system of their branch of science and become respected members of the international scientific community. And the shortest path to this leads through scholarship study or employment abroad.

Questions are being asked today whether we are not selling off the intellectual capacity of the country by authorizing employment abroad. The answer, in light of the above, is unambiguous: No—indeed, Hungarian scientific research can make progress only if it is part of the international research society. And as for those invited to study abroad, the number of scholarships which can be won within the framework of interstate agreements is not increasing, due to the ability of the country to bear the economic burden today, but the number of invited trips has increased to a significant degree and since the invitations often take place within the framework of international cooperation projects set down in writing this also increases the number of foreign researchers visiting our country. And this is very important from the viewpoint of how people judge our country and domestic science and thus from the viewpoint of the development of future contacts. For example, one of the leaders of FRG research, who recently visited our country for the first time, spoke with great respect of domestic research, adding that he had not thought, until he saw it with his own eyes, that Hungarian research had such achievements.

After saying all this I would like to add a note. However gratifying the development and autonomy of the international contacts of Hungarian science, there is a need for the international contacts to be linked in some way to selective industrial development, which is highly desirable and which is one of the elements, perhaps the most important, of progress. That is (keeping in mind, of course, that only good researchers can participate) there should be considerably greater preference given to basic and applied research closely linked to selective industrial development when using the available central funds. This, of course, does not mean that there should be a bar to contacts not fitting this definition, but it would require a contrary, positive intervention.

And can we say, after this, that the international contacts of research and development are in the present situation among those areas where everything is more or less OK?

Yes and no. In light of the above it appears that domestic research and development should exploit to a maximum degree the possibilities offered it by a correct science policy, on behalf of a segment of society which produces additional "hard" resources. But it is also clear that international contacts should not be developed one-sidedly, and that reducing beyond a certain limit the sums which can be turned to this could disturb the development of these contacts, which might be accompanied by unforeseeable consequences in regard to the future of domestic research and development.

8984

Hungary: Head of Science Academy Deplores Cuts in Financial Resources

25020030b Budapest DELTA IMPULZUS in Hungarian No 1, 16 Jan 88 pp 16-17

[Interview with T. Ivan Berend, President of the Hungarian Academy of Sciences, by Tibor Szentgyorgyi: "To Make an Advantage Out Of a Forced Situation"]

[Text] The 1988 economic aspirations presume to an increased degree the activation of intellectual reserves, an increase in the effectiveness of scientific research. We asked President T. Ivan Berend how the Hungarian Academy of Sciences intended to satisfy these tasks and under what conditions it was working this year.

[Question] At its most recent session the Presidium of the Hungarian Academy of Sciences dealt with the program for development. What are the most important Academy features formulated on behalf of the government?

[Answer] In the course of formulating its own work program the Academy emphasized first of all the determining significance of research on the developmental path of the country. Within this it called attention to the extraordinary role of basic research in laying the foundations for technical development, in serving as an intermediary for the international achievements of science and in maintaining a domestic base for a suitable professional culture. Sacrificing everything in the interest of short-term considerations would undermine the future in the strictest sense of the word, would be irresponsible in regard to the future.

The Presidium of the MTA [Hungarian Academy of Sciences] called attention to this with great emphasis. At the same time it feels an obligation to take its part in solving the problems of the country with more efficient research and better use than previously of the more restricted resources.

We worked out a detailed plan for these latter tasks. In this regard we want to achieve a turning point in both the system for financing research and a worthy, professional evaluation of research results. But the proposals also extend to the highly significant areas of scientific book and journal publication and acquisition and cooperation with the universities.

In its comprehensive proposals the Presidium—in accordance with the request of the government—took a stand in organizational questions of science guidance and opposed every reorganizational proposal which would cause unavoidable further disturbances amidst the difficult circumstances and would be accompanied by endangering the research network built up with such sacrifice. It opposed squeezing science guidance into a bureaucratic-state-administrative framework and based its proposals pertaining to more efficient operation of it on a renewal of social-corporate guidance and control of the scientific communities which are now self-administering.

[Question] Do the expert and consulting bodies, and as such does the Academy, join with sufficient definiteness in preparing government decisions?

[Answer] The practice which has been realized for years is for experts from the Academy and other bodies to offer opinions, in the last phase of decision preparation, on the proposals prepared and worked out by the government apparatus. This procedure greatly limits, in advance, the effect of expressing an opinion. In this system those submitting the proposals can take into consideration observations pertaining to the correction of details, but if there are conceptual differences they cannot—and there have been a good number of examples of this in recent years, whether we are talking about the conception for the present 5-year plan or about the draft for the most recent tax reform. So the most conscientious and more definite expert activity cannot really be effective. For this very reason the Presidium of the Academy has now proposed that the present system of expert cooperation should be modified. The essence of the proposal can be summarized in noting that theoretical and practical experts should be brought into the work in the very beginning of preparing government decisions. Preparation should not take place within the apparatus but rather within the framework of social committees created for a period of 1 or 2 years, in accordance with the demands of the work. The positions of the broadest circle of experts could clash and be formed here. We also recommended that consistently constructed advisory bodies should be created along side the decision-making bodies and persons. Obviously the experts of the Academy could have a place in all these too, but the bodies and institutes of the MTA are also ready to independently work out individual partial tasks, and there have been a number of initiatives in this regard in recent years already. I think that by virtue of all this the linking of science into the preparation of government decisions might be more effectively institutionalized.

[Question] What tools are available to those guiding science? To what extent can financial and market methods be used in this area?

[Answer] Realizing the science policy aspirations and espousing valuable research take place both through professional evaluation and material support. I emphatically stress the first—scientific life cannot do without high quality, open debates and a profound professional evaluation of performance. This cannot take place in the form of plan reports and the debating of reports. We are trying to see to it that our professional scientific bodies, in which the university and research institute worlds are represented proportionally but in which greater room

must be given to a more proportional representation than at present of the various researcher generations, should debate the research results themselves, evaluate books, studies and findings. An evaluation based on the international standard is of extraordinary significance, it selects and encourages. But the financial methods are very important as well. The situation at present is that the budget—in the case of the research institutes of the Academy—covers only one third of the expenditures. This sum does not make it possible to finance the institutions and it has forced the research institutes and universities to undertake too broad a scale of contract work. Today this is already accompanied by a reduction in and endangerment of basic research.

Another important source for financing research is government provision for the themes stressed in the 5-year research plans (the OKKFT [National Medium-Range Research and Development Plan]). Only in recent years did we introduce the competition system out of the four billion [forint] fund (the OTKA [National Scientific Research Fund]) created for this purpose. The Presidium of the MTA has now proposed that we simplify the financing system; the budget should make the basic activity possible with institutional financing. But the research programs should be built on a uniform competition fund (a substantial expansion of the present OTKA)—in the area of basic research and social science research. (The 5-year planning system is not suitable in basic research.) Consistent two-channel financing and a significant expansion of the competition sphere therein—if it is based on real performance evaluation—would be an extraordinarily efficient tool for selection, for espousing good and promising initiatives. Market methods can play only an extraordinarily subordinate role here, for basic research cannot be handled with market methods.

[Question] How do the decreasing resources in 1988 make possible increased exploitation of the intellectual potential?

[Answer] The earlier government positions in principle called for preference for the research sphere and according to the promises of the responsible government committees the level of financing would be held at its real value for 1988, indeed they also took a stand for restoration of the earlier withdrawals. It was an extraordinarily unfavorable turn, in comparison to this, that taking into consideration the new withdrawals the real value of budgetary resources available for research institutes is decreasing by about 20 percent. This is a serious bloodletting for an already mistreated research network. We can expect a reduction in personnel averaging about 15 percent and the very existence of some research units has become questionable. The reduction in resources makes it especially necessary for the Academy to review its research network, the almost 40 research institutes and about 80 supported university faculty research sites. Obviously it would not be correct to reduce the narrow assets further at every institution proportionally. Those research programs or research groups which have outlived their usefulness or which are not at a suitable level must be sacrificed for the good of the promising ones. So we have an obligation to cut back selectively. It is the responsibility of the research sites and research communities, and not least of all of those guiding research, to make an advantage out of a forced situation, to use the situation for a really good selection. So we must get rid of ballast we have carried for a long time. An increased exploitation of the intellectual potential in an absolute sense cannot be expected in this way, but a better, more efficient exploitation of the reduced potential is possible.

8984

TECHNOLOGY TRANSFER

Hungary: IFC Membership Yields Funding, Modern Technology

25020026 Budapest FIGYELO in Hungarian 7 Jan 88 p 9

[Article by Dr Judit Toth: "Three Mixed Enterprises; About the IFC; In the Mirror of Results"]

[Text] At the beginning of 1985, at the time of officially joining it, we looked toward the IFC membership of our country with great expectation. By entering the IFC, the International Finance Corporation, we could hope for credits for so-called autonomously led undertakings (under Hungarian conditions, the cooperative sector and private undertakings) and for direct capital investment in mixed enterprises. By way of a reckoning we will now review the results thus far of the IFC activity in Hungary.

So far the IFC has participated in founding three mixed enterprises, with credits and by placing capital. Except for the mixed enterprises there has been no advance of credit or other financial transactions so far, the reason being that a good number of the developments being realized in the cooperative sector do not meet the minimum size requirement posed by the IFC. According to the business policy in effect a placement of capital by the IFC can take place between one and 50 million dollars. In the case of Hungary they set the expected lower limit at 1-2 million dollars—considering our economic possibilities. Since the IFC will finance at most 25 percent of the total cost of a single development the total cost of one investment must be at least 4-8 million dollars. Naturally this is only the lower limit, at which the conditions for placing money are less favorable than in larger volume investments. As the amount placed increases the specific costs to the IFC decrease, which means more favorable conditions for the borrower.

The purpose of investment in or providing credit for mixed enterprises is—as declared in the IFC charter—to aid the efficient investment of the domestic and foreign capital to be combined in profitable undertakings at a developed technical level. Going beyond this catalyst role the fact that the IFC finances primarily mixed

enterprises also has a role in an effort toward greater security. If the party providing the technology also has ownership in the undertaking then long-range profitable operation is better ensured.

The participation of the IFC in founding a mixed enterprise is also advantageous because it greatly increases the confidence of the foreign parties, their willingness to invest capital and thus the magnitude of the capital placed. Domestic experiences thus far confirm this.

It would be difficult to say if the three IFC mixed enterprises formed thus far would have come into being without the cooperation of the organization, and if so under what conditions. It is certain, however, that with its participation it was possible to gain access to technologies, in the case of the two producing undertakings, where talks pertaining to their purchase had proved unsuccessful and where the foreign participants ended up investing significant capital.

The three mixed enterprises—the Unicbank Company, the Hungarian-Japanese Fermentation Industry Company and the Salgotarjan Glass Wool Company—were formed with a total of 88 million dollars worth of investment for their creation and operation. The base capital for the undertakings totals about 40 million dollars of which the IFC contribution is 7.4 million and that of other foreign parties is 12.4 million dollars. The IFC share of the loans is 12 million and an additional delivery credit of about 20 million dollars aids implementation. (Naturally there was only a base capital contribution for creation of Unicbank.) So a total of 20 million dollars in foreign capital was invested in the three undertakings, which makes up a significant proportion of the total domestic import of working capital.

Banks with foreign interests came into being simultaneous with the reorganization of the banking system; the Unicbank Company is the third of these. This full power commercial bank is a "cooperative" not only in regard to its circle of customers but also in regard to its founders! In addition to the IFC the foreign partners are the largest German and Austrian cooperative banks—the Deutsche Genossenschafts Bank AG and the Genossenschaftliche Zentralbank AG. The Hungarian founders are cooperative interest representation organs—the TOT [National Council of Producer Cooperatives], the OKISZ [National Federation of Artisan Cooperatives], the SZOVOSZ [National Federation of Cooperatives], the OTP [National Savings Bank] and the KVH Rt.

Officials from the capital market main department of the IFC played a significant role in setting up the bank, which included convincing the foreign partners, developing a profile for the bank and preparing studies pertaining to implementation. Naturally the IFC continues to help Unicbank with professional consultation and financial means.

The Hungarian-Japanese Fermentation Industry Company was formed to create and operate a lysine factory with a capacity of 5,000 tons per year. The fodder supplement amino acid produced by fermentation from molasses is absolutely necessary for the growth and propagation of domestic mammal and poultry types. When the factory is completed the previous import of lysine will end and the import of soy will decrease. As long as the entire quantity cannot be sold on the domestic market with the change in feeding technology the Japanese parties providing the technology have undertaken to purchase the surplus. The Hajdusag Agricultural Industry Association has the largest amount of capital in the joint stock company, the Japanese parties have subscribed to 20 percent of the shares, the IFC has 15 percent and the Grain Trust and the National Commercial and Credit Bank Company have subscribed to shares as well.

The Salgotarjan Glass Wool Company was created, or the pertinent contracts were signed, on 11 September 1987 after 2 years of intensive preparatory work. When the investment goes into operation—after about 2 years—it will produce a broad scale of glass wool products, primarily to satisfy domestic market needs with this special and valuable insulating material.

The Japanese Nitto Boseki firm, one of the world's three owners of the most developed technology, is a participant in the undertaking, providing the license, within the framework of an agreement by which it undertakes to provide not only the present technology but also the continual developments, thus ensuring the long-range competitiveness of production.

The initial capacity of the plant is 4,400 tons per year, with the possibility of expanding capacity to 6,000 tons. About one quarter of production will be exported, partly through the Japanese partners and partly through the direct contacts of the mixed enterprise.

Japanese enterprises are the technological partners of both producing undertakings. There is also serious Japanese interest in the projects being prepared, which is explained primarily by the leading role played by Japan in putting out capital. Because of the strong yen the deterioration in the conditions for direct sales also justifies the increasing activity of Japanese enterprises in placing capital.

There is also serious interest from the Hungarian side in Japanese investments, especially in the case of implementing peak technologies. Another factor is that Japanese Government organs give significant support to their investors and—in some cases—to foreign enterprises created with Japanese participation.

The creation of a number of similar projects in the near future can be expected on the basis of discussions under way and probably there will also be new special credit agreements. In addition to founding and providing credit for mixed enterprises preparations are also under way for the development of direct IFC credit offers and credit packages.

8984

BIOTECHNOLOGY

Cuba, Other Latin American Countries in Joint Projects

36990050a Buenos Aires CIENCIA Y TECNICA in Spanish No 13, 1987 p 2l
[Article: "Toward a Latin American Biotechnology"]

[Text] The meeting of the Regional Program in Biotechnology took place in Mexico, under the sponsorship of various international agencies, deciding upon joint research and development projects.

With the participation of Argentina, Brazil, Colombia, Costa Rica, Chile, Mexico, Peru, Uruguay, and Venezuela, countries to which Guatemala was added, there convened in Mexico the first meeting of the Regional Program in Biotechnology for Latin America and the Caribbean, under the sponsorship of the United Nations Development Program's (UNDP) Directorate for Latin America and the Caribbean (DFLAC), the United Nations Organization for Industrial Development (UNOID) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). A delegation from the Pan-American Health Organization's (PAHO) also participated in the meeting.

Dr Esperanza Ballester, from DFLAC, made the presentation of the program, stressing the fact that its implementation would begin after this meeting, with the participation of 10 countries from the region. The Argentine, Oscar Grau, delivered a brief report detailing the work done by the technical coordinators to develop the program. Both accounts were approved by the Board of Directors.

It should be noted that Dr Grau was appointed technical coordinator, a position that he will share with Dr Rodolfo Quinteros. Grau was also named general director of the program until the next board of directors meeting.

The Projects

After an exhaustive analysis of the projects submitted, four projects were unanimously approved, with the recommendation that they be put into operation immediately:
Development of diagnostic systems for plant virosis
—Participating countries: Argentina, Colombia, Costa Rica, Chile, Uruguay, and Venezuela
—Director: Maria Luisa Mayoral, of Venezuela
Diagnosis of tripanosomiasis and leishmaniasis in different endemic areas of America
—Participating countries: Argentina, Colombia, Chile, Peru, and Venezuela
—Director: Andres Ruiz, of Argentina
Enzymatic degradation of agroindustrial waste
—Participating countries: Chile, Peru, and Venezuela
—Director: Victor Carrizales, of Venezuela
Industrial production of amidase-penicillin and its use to procure 6-aminopenicillanic acid (6-APA)
—Participating countries: Colombia, Cuba, and Mexico
—Director: Ofelia Valdes, of Cuba

As for the project "Development of new diagnostic probe marking systems in malaria, enteropathies, and hepatitis," it was decided to begin its execution immediately insofar as the probes for the first two diseases are concerned. With regard to hepatitis, it was left contingent on the results of the evaluation. Cuba, Chile, Mexico, and Peru will participate in executing the project, under the direction of the Mexican, Paul Lizardi.

Based upon the status of the analysis being made of the project "Technological development to procure an enzyme that will hydrolize lactose in milk and serum," it was decided, in principle, to authorize the technical coordinator to start its execution once the evaluation has been completed, (obviously) if it proves positive. This project will be directed by the Mexican, Lidia Casas, with the participation of Colombia, Cuba, Chile, Mexico, Uruguay, and Venezuela.

Human Resources

Another point discussed was the execution of activities to train human resources. In this respect, the motion to provide support for the bacterial genetic engineering course to be held in Costa Rica, and the one on molecular hybridization, which will take place in Uruguay, both this year, was passed. For 1988, support will be given to a course organized in Colombia on practical applications of monoclonal antibodies, and to the one that will be given in Chile on those of molecular biology techniques.

It was also decided that, in connection with the Latin American Congress on Biotechnology to be held in Tucuman during October of this year, a 1-day symposium should be organized on national and regional policies in biotechnology.

At the close of the sessions, the chairman of this first Board of Directors meeting, engineer Tomas Rodriguez Weber, declared that the program "is palpable evidence of the desire for integration on the part of the peoples and governments of Latin America," and that it could serve as a model for spurring on activities in other fields. The next meeting will be held in Chile, during February or March 1988.

2909

Possible EC, Latin American Cooperative Ventures

36990050b Buenos Aires CIENCIA Y TECNICA in Spanish No 13, 1987 pp 34-37

[Article: "Europe Looks Toward Latin America"]

[Text] Multisectorial delegations from Argentina, Brazil, Mexico, and the Andean Pact were invited to participate in a seminar on biotechnology in Brussels, at which they submitted their respective research programs in that field to the European Communities Commission.

Software Workshops

During May and June of this year, the interdisciplinary team of the Educational Software Production Project and members of the Rosario and La Plata production centers held various workshops. They were devoted to an analysis of the production of educational software and expert educational systems.

The Spanish specialist, Fernando Arriaga Gomez, participated in them.

With the Provinces

In conjunction with the Computer Training and Education Program, several courses have been organized, in cooperation with provincial agencies.

During April, in Misiones Province, the modules on "Policy Guidelines" and "Contributions From Technology to Education" were developed, with the assistance of officials from the Provincial Undersecretariat of Education, and the Tele-Education and Development System (SIPTED), as well as secondary level instructors. Subsequently, during May, the course on "Introduction to Computers" was held. In Santa Fe, the courses organized with the Provincial Commission on Computers and Education were entitled "Policy Guidelines" and "Contributions from Technology to Education."

Meanwhile, during the first 3 days of July, in Rio Negro, the modules on "Prolog Language" and "Expert Systems and Artificial Intelligence" were issued.

Upon the completion of this bulletin, the dates were being coordinated for holding these courses in Neuquen, Cordoba, Mendoza, Formosa, and Jujuy Provinces.

Agreement With Telematica

The Undersecretariat of Computers and Development (SID) has signed an agreement with the firm Telematica, Inc., stipulating that this company will equip the country's educational software production centers.

Telematica, Inc., will deliver to the centers, with headquarters at the Universities of Rosario and La Plata and in the Mendoza Ministry of Education, equipment consisting of an MSX2, TPC-300 Talent console, accompanied by the MSX dPF-550 Talent diskette, the MSX TMS-510 Talent modem, a 14-inch television set, an image digitalization unit, and a cable for a parallel printer. The SID Central Coordination Unit will receive two identical sets of equipment.

The educational software production centers resulted from an agreement between SID and the Intergovernmental Office for Computers (IBI), and their production will be aimed at the development of materials and programs to meet the training requirements.

The agreement asserts: "SID, through the Coordination Unit for said project, pledges to guarantee that the use of the equipment will be for the stated purposes, and come within the scope of educational software production."

It also specifies that Telematica, Inc,"and the Intelligence Development Center may have access to the material produced, or become apprised of it; although it is expressly stated that said materials will in no instance be marketable by Telematica, Inc, or CEDI."

Educational Computers

From 5 to 7 August, in Cordoba, the Second Federal Congress on Computers in Education took place, organized by the Secretariat of Education, the Undersecretariat of Computers and Development, and the Federal Council on Computers. According to statements made by Dr Correa, undersecretary of computers, this second congress was intended "to learn and capitalize on the existing experience, in a participatory setting, wherein the realities of each federal state would be considered, and the teaching establishments, the government sector, and the computer field would be integrated, in order to pool ideas for the incorporation of computers into education."

Concurrently with the congress, a course-workshop was held on educational software, as well as teacher training workshops, and anexhibit of computer products used for education.

Between 27 and 29 April, in Brussels, the European-Latin American Seminar on Biotechnology: Options for Cooperation, organized by the European Communities Commission (CEC), was held, for the purpose of analyzing the existing options for cooperation between the European and Latin American countries in the area of this advanced technology. In particular, it was intended to consider the existing national programs, their determinations of scientific and technical priorities and requirements, and the industrial and investment imperatives, in order to ascertain the possibilities for scientific, technical, and industrial cooperation.

The Latin American delegations (Argentine, Brazilian, Mexican, and Andean Pact) were comprised of those who devise the respective policies, public and private business owners, and representatives from thescientific community. The European participants included members of CEC, and representatives of the member nations' biotechnology programs,and of industrial and university circles.

The first part of the seminar took place in Brussels. During the course of six meetings, each delegation submitted its report. The second part consisted of visits by the Latin American delegations to different Community countries, in order to observe, "in situ," the existing activities and the possibilities for cooperation. Each of them scheduled its own visiting plan.

A Programmed Future

The sessions were opened by Prof Paolo Fasella, general director of science, research, and development for CEC. The next speaker was the vice president, Dr Karl-Heinz Narjes, followed by the Argentine ambassador to the Community, Ramiro Alfonsin.

Dr Narjes commented on the work being done by the commission in the field of science and technology for development, through a 4-year program which concluded in 1986, the second phase of which will end in 1990.

In 1983, the European Communities Council launched a 4-year program for research and development in the field of science and technology in the service of development, aimed at aiding developing countries. Based on the results accrued, and the experience gained, this year a second phase is being started, including two subprograms: tropical and subtropical agriculture, and health and nutrition in tropical zones. In order tocarry it out, the funds previously allocated have been doubled.

Other proposals have also been introduced into the program, such as the promotion of associated research systems; encouragement of short, medium, and long term research; the provision of minimal teams for laboratories; and backing for the mobility of researchers.

The first program was concentrated mainly on Africa, and Latin America's participation was almost nil. It is thought that the restrictions concerning the tropical and subtropical features of the previous program will be fewer during this new phase, owing to the interest voiced in expanding cooperation with Latin America.

The selection criteria, which have been retained to date, are: scientific quality of the proposal and of its author; consistency with the socioeconomic problems of the developing countries, and the strategies used to solve them; possibility of cooperation between research agencies of the member nations and of those which are developing; complementary nature of the bilateral, multilateral, and/or community research and development activities; regional impact, extent, and urgency of the problems to be solved; and purpose of the requests, aimed particularly at food self-sufficiency, improvement of health, and reinforcement of research activities in the developing countries.

An Ideal Time

The Argentine Ambassador to the Community, Ramiro Alfonsin, declared: "Latin America cannot remain dissociated from the development of biotechnology, and therefore I enthusiastically congratulate the organizers of this seminar on their idea to gather men and women from the two continents interested in these issues."

He continued: "From the standpoint of the man of science, the current atmosphere in biotechnology is somewhat like the ideal environment; it seems like an enormous field offering extremely vast possibilities, regarding which both reseachers and business people, and those trying to plan scientific research policies, should stop, meditate, and decide where to direct the efforts and resources, which are always limited."

In the ambassador's opinion, there are three areas in which biotechnology could contribute to fundamental progress for mankind. They are: the pharmaceutical field; the procurement of basic chemical products from products of organic origin; and agricultural production.

Regarding the latter area, and the obstacles that agricultural production poses on the European continent, he claimed that it was necessary "to correct the expensive inefficiency of their agriculture without delay. Europe would be mistaken if it persisted in continued production at excessively high costs, shielding itself with a protectionism that is detrimental to it. Europe needs to start now,investigating new varieties of crops which do not require so much fertilizer and pesticides, so as to be ready when the time comes for it to compete fairly on the world market."

He subsequently added: "With so much to be done, it doesn't seem sensible to expend efforts and funds trying to raise production with very costly techniques, which are incapable of withstanding fair competition. The Latin American technicians want to cooperate in this scientific research. Latin American farmers are not afraid of competing on an equal footing with the Europeans. What we cannot do is compete with the subsidies from the U.S. Treasury, or the American budget."

Finally, Ambassador Alfonsin stressed that, "We Latin American nations feel obliged to think that we must reduce the gap separating us from the industrialized countries, both in the field of biotechnology and in other areas of science and industry; particularly if we consider

the fact that the development of certain products, which may not have any economic interest for the developed nations, could be of vital importance to us."

Regional Integration

During the same opening session, an account was given of biotechnology in Argentina. Dr Sara Rietti discussed the scope of the national program; Dr Hector Torres gave a description of the scientific and technical system; and Dr Jose Latorre explained the operation of the Argentine-Brazilian Biotechnology Center.

After noting that, "Regional alliances have proven to be a useful tool for fostering the integrated development of groups of countries with similar or complementary problems," Dr Latorre remarked that the protocols on integration between Argentina and Brazil entail the creation of "a consumer market of 160 million inhabitants, one of the largest in the Western world, while at the same time the productive capacity of both nations is increasing significantly."

He then cited the reasons prompting the integration: "In this connection, the presidents of both countries considered the strategic importance of scientific and technical research in the field of biotechnology; the need for improving the human and scientific resources of both countries in the sector; the volume of investment necessary to achieve a minimal scale of research; and the cost reduction that would be attained through the coordination and joint execution of research activities."

With regard to the subject areas in which the center will operate, Dr Latorre said that there would be three: human health, agriculture and livestock (agro-food industry), and energy. The next point in his report was the development of the criteria to guide the selection of activities, following which he underscored the importance to the center of substantive participation by the private productive sectors of both countries and the need for ensuring channels that would make such participation possible. In this connection, he emphasized: "Our presidents have decided that the activity is to be aimed at backing projects with biotechnological applications, fostering integration between state universities and institutions and business firms, for the ultimate purpose of producing goods and services of social and commercial benefit."

Argentine Suggestions

Dr Sara Rietti, coordinator of the National Biotechnology Program and chief of the Secretariat of Science and Technology's office of advisors, was responsible for describing the program's working method.

She cited its structure and operation, as well as its basic functions and the work done aimed at training human resources, international cooperation, and activities carried out in the area of intersectorial cooperation within the country.

She stressed PNB's role as a priority exercise in scientific aand technical policy, given the assets accumulated in the form of basic knowledge; its potential capacity for becoming a technological tool in productive sectors with outstanding records in the country, such as agricultural and livestock activity, food industry, pharmaceutical industry, etc. To these advantages, Dr Rietti added the typical distribution that this program has throughout the country. This means that biotechnological production could achieve a regional dimension in Argentina.

As for the potential mechanisms for reinforcing the existing cooperation and flow of information, she suggested a series of implements, prominent among which were the execution of intensive training plans; improvement and training of research and development personnel on all levels; the execution of joint projects in areas considered a priority by the program, fostering the exchange of specialists and a contribution to the provision of technical equipment lacking in Argentina; and establishment of industrial plants that would contribute advanced technologies and employ local personnel on all levels (they would have to allocate a substantial percentage of their profits for research and development on the part of local professsionals trained by the investors, and a substantial percentage of their production for research). Other proposals were: the association of European firms with other Argentine firms, whereby the actual transfer of the technologies provided by the European side would be ensured; the establishment of international services involving scientific and technical data bases associated with biotechnology, accessible to Argentine public and private entities; and the establishment of information and documentation boards in the area of the European countries' cultural dissemination agencies operating in the country.

Beneficial Experience

The other reports at the seminar were delivered by specialists from Mexico and Brazil, an Andean Pact representative, and specialists from Belgium, the Federal Republic of Germany, Denmark, Spain, Greece, France, Ireland, the Netherlands, Italy, Portugal, and Great Britain.

Simultaneously with the reports, which in all instances were accompanied by questions and followed by a general discussion, meetings were heldby individuals or groups of business owners and researchers, giving rise to fruitful contacts and establishing commitments for future associations. The second part of the seminar for the Argentine delegation consisted of a series of visits to institutions in Belgium, the Netherlands, France, and the Federal Republic of Germany.

Some Conclusions

Among the conclusions reached by the Argentine delegation participating in the seminar, the following should be underscored:

Opening of opportunities for cooperation with EEC countries with which no previous contacts had been established, the Netherlands, for example.

Intensification of the relations with those countries with which prior contacts did exist. Identification of concrete opportunities for cooperation, stemming from the visits paid, and the possibility of an exchange of ideas among those interested.

Possibility of determining a comparative profile of opportunities for cooperation with the different EEC countries, allowing for selection of the options most closely geared to the country's requirements and capacities.

Possibility of establishing institutional relations with the EEC, for which there was virtually no precedent, opening up channels for the execution and financing of joint projects, and for backing the training of human resources, dealing specifically with the post-graduate sector, in view of the local capacity to provide for the graduate portion.

Association with other countries and institutions in which an active business-government-scientific/technical system has been developed. The achievement of a similar relationship is a priority goal for Argentina, and hence the experience of certain European nations would prove to be very beneficial.

Opening of communications with institutions, laboratories, and associations that have included the National Biotechnology Program on their mailing lists, providing information of great interest which (through the available media) is conveyed to the entire scientific and technical and business community linked with the area.

2909

Argentina To Establish Center of Excellence in Chascomus

36990050d Buenos Aires CIENCIA Y TECNICA in Spanish No 13, 1987 pp 29-31

[Article: "Argentina Opens a New Center of Excellence"]

[Text] Under the auspices of the Secretariat of Science and Technology, through a cooperation program with the United Nations Development Program (UNDP), the Chascomus Technological Institute(INTECh) is under construction; a research and development center that will cover the fields of plant and animal biotechnology, and ecology of the region, the opening of which has been planned for the second quarter of 1988.

Chascomus lies only 125 kilometers from the city of Buenos Aires, in the so-called Salado basin, an area typified by the value of its agricultural and livestock production and its fish breeding potential.

There, INTECh is under construction, on an area of 900 hectares owned by it, and located on the shores of Chascomus Pond, suited for agricultural and livestock operations and for use as an experimental site. A covered area of 2,300 square meters will be the context in which this new research institution will undertake to devise its own technologies, emanating from the use of basic information to solve specific problems. It is intended to become a center of excellence and an enclave of scientific and technical development, through the incorporation of solid, vigorous research groups. And it will have to participate in the training of national and Latin American scientists and technicians, with applied and transfer orientation; constituting a key center for rotation of researchers and for the organization of intensive courses and symposia, with the participation of invited specialists. The quality of its scientific and technical activity will be controlled by a Scientific Council consisting of from six to eight members, comprised of individuals associated with the organization's activity, and representatives of academic entities and both regional and international agencies also associated with INTECh.

The management of the institute will be carried out by a director proposed by the Scientific Council who will hold his position for 5 years, which is renewable, and to whom the chief of research and the chief of administration will be subordinate. The former will serve as deputy director. The researchers with the rank of group chiefs will comprise an Advisory Committee, which will assist the director, together with the chief of research.

INTECh will have public, private, and international financing, and will have available the profits accrued from the utilization of the area owned by it and the benefits from the transfer of technology. The institute will promote the participation of private business firms, through agreements, or the formation of new firms for the execution of specific projects, which will ensure a prompt transfer of the experimental results to the productive sector. These activities will represent an additional source of funds for its operation. The INTECh researchers will receive the following benefits, among others:

Academic: independent personal development; formation and direction of a working group (of up to five persons in biotechnology, or up to four in ecology); completely new laboratories and equipment, installed at the beginning of the project; interaction with other youngresearchers on interdisciplinry projects

Labor: contracting for a 5-year period, renewable for longer intervals: access to family housing in Chascomus, on advantageous terms; pay in keeping with their responsibility; share in the economic benefits of the transfer of technology

Subject Areas

In addition to the two main research areas (plant and animal biotechnology, and ecology of the region), an aquicultural section, associated with them, completes the academic structure planned for INTECh.

The biotechnology area will include four basic specialties: biology and molecular genetics, biochemistry, fermentation-microbiology, and immunology; with an original staff of approximately 25 persons. The plans for this area call for the installation and equipping of six laboratories, each measuring about 70 square meters.

INTECh will constitute the nucleus of a Biotechnological Industrial Park on adjacent land. For this purpose, conditions will be created to facilitate the establishment of other laboratories and business firms associated with the institute's activities. The interaction between INTECh and the Biotechnological Park will represent an innovative model for the country, in the development of a leading technology.

The subject areas on which the institute will concentrate its biotechnological effort are:

Diagnostic reagents and animal vaccines: virosic and bacterial diseases, mycosis, and parasitosis of animals for agricultural-livestock exploitation, and fish; development of polyclonal and monoclonal antibodies; DNA probes and antigens; development of vaccines using conventional methods and/or recombining DNA technology

Production of biomolecules for animal use: hormones for agricultural-livestock and fish breeding production, antibiotics, fungicides, and pesticides; procurement and fermentation of natural microorganisms or those modified by genetic engineering; and development of extractive methods

Animal improvement: genetics of populations, breeds, and varieties of mammiferous species, birds, and fish of economic importance; detection of chromosomic and genic polymorphisms associated with productive value; manipulation of embryos; generation of hybrids; procurement of transgenic animals

Diagnostic reagents in plants: virosic and bacterial diseases, mycosis, and parasitosis in species of economic importance; development of polyclonal and monoclonal antibodies, and DNA probes

Production of biomolecules for plant use: fungicides, parasiticides and insecticides; production based on natural microorganisms or those modified by genetic engineering; fermentation and development of extractive methods; bioinsecticides of bacterial origin

Biological fixation of nitrogen: genetics, molecular biology, and physiology of nitrogen fixation; selection and improvement of hosts and microorganisms

Plant improvement: genetics of populations and varieties of economic importance; detection of chromosomic and genic polymorphisms associated with productive value; micropropagation and cultivation of plant tissues; introduction of genes into plants, aimed at procuring varieties with higher protein quality, and resistance to phytopathogens, herbicides, and environmental stress conditions

Genetics and biosynthesis of natural products: procurement of products with pharmacological action or industrial use, from microorganisms or plants

Concurrently, the subject matter that the regional ecology area will cover, at the outset, is as follows:

Ecology of regional systems: simulation models of regional systems; hydrology applied to the management of large basins; ecological planning of the use of land; flow of sediments or contaminants on the regional level

Ecology of fresh water communities: temporal succession and dynamics in pond environments; nutrient cycles, eutrophication problems; managementof large ponds; water pollution

Ecology of land communities subject to floods and/or with poor drainage: cycles in the area of environments subject to flooding; temporal succession and dynamics associated with agricultural-livestock use; management of natural communities, effect of grazing; flow of contaminants and sediments

Techniques to evaluate the environmental impact in pond environments or those subject to floods: impact evaluation techniques; evaluation of pollution levels; measurement of the environmental quality; planning management adapted to the environment

Dynamics of fish populations: sampling of large populations in natural ponds, life charts, projection matrixes; catch optimization models in fisheries; feed and forage

Herbivors, dynamics of grazing in natural communities: productivity of the vegetation; seasonal cycles; environmental changes caused by breeding livestock; optimal forage theories; herbivor-plant interactions in herbaceous communities

Flora and fauna conservation in aquatic-terrestrial environments not subject to floods: planning of conservation areas and systems; conservation problems of aquatic birds; migration and extinction of species; inventory of natural resources applied to conservation

Finally, the aquiculture section will engage in the cultivation of fresh-water fish: feeding and reproduction techniques; control of health, genetics, and zootechnology of the atherine; optimization of environmental conditions; and pisciculture of repopulation

The two main research areas will have over 1,000 square meters of space for common use, including cultivation rooms, controlled temperatue chambers, and areas for microscopy, radioactivity, photography, ultracentrifugation and computation, a library, conference room, dining room, etc. The opening of the Chascomus Technological Institute has been set forApril of next year, the date by which the main construction is due to be ready, and the research groups formed.

Selection of Researchers

The SECYT-INTECh project called for a competition for selection ofresearchers, to name group chiefs for the Chascomus Technological Institute, and those directing projects included in the subject matter objectives and priorities set for the areas of biotechnology and ecology, and for the aquiculture section.

Nine young researchers were chosen, who will serve as heads of projects in the following special fields:

Biotechnology area: six researchers; biology and molecular genetics, biochemistry, fermentation-microbiology, and immunology

Ecology area: two researchers; ecology of terrestrial communities, and ecology of aquatic communities

Aquiculture section: one researcher; fresh water fish

The research groups are due to be formed and to begin their work during the first half of 1988.

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Argentina, Brazil Establish Joint Programs

36990050c Buenos Aires CIENCIA Y TECNICA in Spanish No 13, 1987 pp 38-40
[Significant Practical Advances in Biotechnology]

[Text] Following the structuring of the Argentine-Brazilian Biotechnology Center, the second meeting of the center's Binational Council took place, on which occasion it was decided to issue the first call for submission of preliminary technological research and development projects. Moreover, progress was made in the organization of the future Argentine-Brazilian School of Biotechnology.

During the second meeting of the Argentine-Brazilian Biotechnology Center's Binational Council, held in Buenos Aires during June, the first areas and topics of mutual interest to both countries were identified, on the basis of which the first call was made to public and private researchers and entities to submit preliminary research projects. The latter will be selected for purposes of their financial backing, based on the following criteria: existence of a Brazilian counterpart, commercial interest, technical-economic feasibility, social impact, strategic importance, prospects of results within relatively short periods of time, and complementation of Argentine and Brazilian capacities.

The deadline set for this first call was 14 August 1987. The areas of health, agriculture and livestock, and complementary activities were selected for this call:

Health:

Triple vaccine: improvement and technological innovation

Production of diagnostic reagents and vaccines for type B hepatitis

Antibiotics through fermentation

Monoclonal antibodies and molecular probes (histocompatibility, blood groups, and others)

Agriculture and Livestock:

Improvement and production of plants using biotechnological methods

Vaccines and diagnostic reagents for animal use

Animal improvement and reproduction

Innoculants: technological innovation

Complementary Activities:

Scaling up of protein purification processes

Enzyme production

Reagents for genetic engineering

Scaling up for production of monoclonal antibodies

Insofar as the concrete financing of projects was concerned, it was decided that the center would finance the research and development projects, in both the public and the private sector, using the appropriate mechanisms existing in each country.

School of Biotechnology

Participating in the second meeting of the Binational Council, from the Argentine section, were Dr Sara Rietti (SECYT [Science and Technology Secretariat], National Biotechnology Program); Raimundo Florin (Secretariat of Industry and Foreign Trade); Ana de Alberto (Ministry of Foreign Relations and Worship); and Cristina Ficher (Ministry of Economy); and, in the capacity of

observers, Claudio Lozano (Ministry of Economy) and Marcelo Camusso (SECYT). And, in attendance representing the Brazilian section were Paulo de Campos Torres Carvalho (Secretariat of Biotechnology), Everton Vieira Vargas (Ministry of Foreign Affairs), and Zich Moyses Junior (Ministry of Industry and Commerce). Brazilian observers were Enriqueta Lacourt Borba (Ministry of Science and Technology), and Rodrigo do Amaral Souza, from the Brazilian Embassy in Buenos Aires. Finally, representing the center's administration, the participants were its director, Dr Jose La Torre; Edmundo Reichmann, Brazilian vice director; Celia Bercovich, executive secretary; and Miguel Rodriguez, member of the vice administration exercised by Brazil. The other significant aspect of this meeting was the analysis of the structuring of the Argentine-Brazilian School of Biotechnology, with acceptance of the recommendation from the center's administration. On this basis, the school will concentrate its activities on the following areas: biochemical engineering, genetic engineering, microbiology, and plant and animal cell production.

In principle, the school will engage in the following activities:

Backing of theoretical-practical specialization courses sponsored by academic and scientific institutions of both countries in the aforementioned fields, which are of concern to the training of their human resources

Annual holding of short-term courses in either country

Backing for the preparation of specialized literature in the aforementioned fields, for training in each of the two countries

Backing for courses, symposia, and seminars sponsored by each country's academic and scientific institutions

Backing for teacher exchanges between institutions of each of the two countries

At this same meeting, it was decided that the school's first short-term course would be held during the first quarter of 1988, in Curitiba. For this purpose, the Binational Council charged the center's administration-with the adoption of the necessary measures to implement the school's activities.

The council was also informed of initiatives under way in both countries, which might have support available from the school: advanced microbiology course (Department of Exact and Natural Sciences, National University of Buenos Aires); and international symposium on genetics for biological efficiency in production (Luiz de Queiroz Advanced School of Agriculture, University of Sao Paulo, Piracicaba, Brazil).

Director: Jose La Torre

The opening ceremony for the Argentine-Brazilian Biotechnology Center took place in Brasilia, last April, in the presence of the Argentine secretary of science and technology, Dr Manuel Sadosky, and Dr Renato Archer, Brazilian Minister of Science and Technology.

Both Minister Archer and Secretary Sadosky emphasized the importance of the event, citing the political will for integration of both countries, and the significance that this has acquired in the area of leading technologies which, in the specific case of the center, will make it possible to carry out joint research projects with the participation ofbusiness firms, universities, and research centers of both countries, with a view toward the production of goods and services that will have a social impact, commercial interest, and strategic importance, in addition to constituting an entire technological innovation.

After the opening, the first meeting of the Binational Council took place, at which time the appointment of the center's authorities was undertaken. Dr Jose La Torre was unanimously named its director. Serving as vice directors will be the Argentine, Rodolfo Ertola, and the Brazilian, Edmundo Reichman. At the same time, the Argentines Luis Leloir, Edwald Favret, and Ruben Vallejos, together with the Brazilians, Diogenes Santos, Carlos Medici Norel, and Walter Borzani, were named members of the Advisory Committee. Alternate members of the committee are Elsa Segura, Raul Trucco, and Enrique Rotstein (of Argentina), and Luis Barreto Castro, Isaias Raw, and Carlos Diniz (of Brazil).

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